A META-ANALYSIS OF DISSERTATION RESEARCH ON THE RELATIONSHIP BETWEEN PROFESSIONAL LEARNING COMMUNITY IMPLEMENTATION AND STUDENT ACHIEVEMENT

by

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ABSTRACT

The purpose of this study was to conduct a meta-analysis of dissertation research that examined the implementation of professional learning communities (PLCs) and student achievement in preK-12 schools. An exhaustive search for such unpublished studies was conducted using the following criteria: 1) the studies were available on dissertation data-bases; 2) the studies originated from institutions with the classification of Carnegie Doctoral/Research Universities-Extensive between 1997 and 2012; 3) the studies involved student achievement data from preK-12 schools; 4) the studies included some type of assessment of PLC characteristics and some form of student academic achievement data which were quantitatively linked; and 5) the studies reported the quantitative data necessary to calculate effect size (i.e., *r*, R^2, regression, ANOVA, or *t*-test data). It was hypothesized that the implementation of PLCs in preK-12 schools would result in increases in student achievement in reading and math, and that collective or teacher efficacy, would serve as mediating variables between PLCs and student achievement.

A final set of 21 dissertations was included in this analysis. Based on the Hord model, analyses for PLCs and student achievement in reading and math as well as separate analyses for each PLC component were conducted to determine if significant relationships existed between PLC implementation and student achievement. Results indicated that Shared and Supportive Leadership, Shared Vision, and relational factors of Supportive Conditions were influential in these analyses. Although the hypothesis that PLC implementation significantly increases math achievement was not supported, the hypothesis that PLC implementation significantly increases

reading achievement was partially supported. The third hypothesis, collective or teacher efficacy, are mediating variables between PLCs and student achievement was also partially supported. Implications for practice and future research were included.

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CHAPTER I:

INTRODUCTION TO THE STUDY

Background

Calls for reform of American schools are not new. From the uncertainty of the Cold War to the perceived loss of world economic dominance in the 1980s, politicians and the U.S. media have called for a major overhaul of the American educational system (Spring, 1993). One of many proposed answers to the failings of the U.S. educational system was the reauthorization of the *Elementary and Secondary Education Act* (2002), otherwise known as *No Child Left Behind* (NCLB). As part of the standards movement, NCLB required states 1) to develop standards for reading, math, and science; 2) to create criterion-based assessments to assess student performance in these subjects; and 3) to provide quality, research-based professional development for teachers to strengthen their instructional knowledge (NCLB, 2002).

As a result of this often-maligned legislation, schools across the country began to focus more attention on student performance in reading and mathematics. This legislation necessitated that schools disaggregate their data from these assessments and teach not just to the average school performance, but also to the individual child (NCLB, 2002). According to Phillips (2003), the advent of this legislation meant that schools could no longer hide behind a stellar average school performance while neglecting the education of whole subgroups of children.

Perhaps related to these reforms of the last decade, overall student achievement has improved, albeit on standardized tests, whose usefulness to measure authentic student learning is questionable at best (Nichols, Glass, & Berliner, 2006). According to the National Assessment of

Educational Progress (NAEP) results for 2008, average reading scores for fourth grade, eighth grade, and twelfth grade students increased from 2004 to 2008 (National Center for Education Statistics, 2009). In mathematics, average scores for fourth and eighth grade students increased significantly, while those of twelfth grade students did not change significantly from 2004 to 2008.

Disparities in performance among subgroups of students, however, still persist (NCES, 2009, 2011). White students still continue to outperform other ethnic groups in reading and math. Comparing NAEP scores from 2004 to 2008, there were no significant changes in achievement gaps in reading between Black or Hispanic students and White students (NCES, 2009, 2011). In fact, gaps between the groups on the high school level widened slightly. Additionally, there were no significant changes in the math achievement gaps between White and other ethnic groups from 2004 to 2008. Although there were significant increases in the reading and math performance of some of the lowest achieving students in fourth and eighth grades, those at the 10^{th} and 25^{th} percentile specifically, the math scores on NAEP for twelfth graders remained relatively unchanged.

Students in the United States are being outperformed on international measurements of literacy and math performance. In 2009, the Program for International Student Assessment (PISA) reported the reading and math literacy scores for 65 nations, including the 34 countries in the Organization for Economic Co-operation and Development (OECD), the group of nations with the "most advanced" economies. According to the PISA report:

1. In 2009, the average U.S. combined reading literacy score for 15-year-old students was not measurably different from the average score of the 34 OECD-member countries. The U.S. average score was lower than that of 6 OECD countries and higher than that of 13 OECD countries. (NCES, 2011, p. 52); and
2. In 2009, the average U.S. mathematics literacy score for 15-year-old students was below the average score of the 34 OECD member countries. On the science

> literacy scale, the average U.S. score was not measurably different from the OECD average. (p. 54)

In fact, students in the United States, on average, performed lower in math literacy than 23 other countries, including 17 OEDC countries (NCES, 2011).

While NCLB and a decade of reforms may have precipitated some increases in student achievement, there is room for improvement. External reforms mandating that states develop new standards for instruction, create new standardized assessments, and provide "high quality" professional development for teachers has coincided with minimal gains in student learning.

Other research has found that the success of any reform effort lies within teachers (Bryk, 2010; Darling-Hammond, 2007; Jolly, 2008; King & Newmann, 2001; National Commission on Teaching and America's Future, 1996; Strahan, 2003; Wood, 2007), and "ultimately, teachers decide how they will teach" (Wiley, 2001, p. 1). According to Rosenholtz (1989a, 1989b), teacher learning depends largely on their "recognized need for new skills" (1989b, p. 428). Otherwise "good" teachers may resist professional development that does not correspond with their perceptions of what falls within their job responsibilities as an educator (Little, 1984). Several have argued that high-quality, research-based, sustained professional development for teachers is paramount for improving teacher and student learning (NCTAF, 1996; Darling-Hammond, Wei, Andree, Richardson, & Orphanos, 2009; Yoon, Duncan, Lee, Scarloss, & Shapley, 2007).

Statement of the Problem

The No Child Left Behind legislation outlined clear criteria by which high quality professional learning for teachers would be judged:

1. It is sustained, intensive, and content-focused—to have a positive and lasting impact on classroom instruction and teacher performance;

2. It is aligned with and directly related to state academic content standards, student achievement standards, and assessments;
3. It improves and increases teachers' knowledge of the subjects they teach;
4. It advances teachers' understanding of effective instructional strategies founded on scientific research;
5. It is regularly evaluated for effects on teacher effectiveness and student achievement. (Yoon et al., 2007, p. 2)

The last indicator has implications for future professional development efforts. Because federal education dollars tied to NCLB have to be evaluated against student achievement outcomes, states, districts, and schools need to deliver high quality learning opportunities for teachers which are believed to increase student learning (Desimone, Smith, & Ueno, 2006; Darling-Hammond et al., 2009; Yoon et al., 2007). Policy makers have found that "students are not likely to perform at higher levels until teachers begin performing at higher levels" (Killion & Harrison, 2006, p. 8).

Outside the ramifications of NCLB, professional development is the largest expenditure in school reform efforts (Desimone et al., 2006). If educators are to make more financially sound decisions, perhaps more rigorous research should focus on establishing empirical links between student outcomes and the types of professional development most likely to produce increased teacher and student learning (Desimone et al, 2006; Yoon et al., 2007). In a meta-analysis of nine studies of the effects of professional development on student achievement, Yoon and colleagues did find moderate affects of professional development and student performance.

According to Hattie (2009), total teacher effects account for 35% of the variance between classrooms ($d = 0.49$), with professional development accounting for 44% ($d = 0.62$). Some research indicates that ongoing, job-embedded professional development for teachers provides associated increases in student gains (Desimone et al., 2006; Darling-Hammond et al., 2009; Phillips, 2003; Yoon et al., 2007); however, research also indicates that few teachers have access

to sustained professional learning opportunities (Desimone et al., 2006). According to Desimone and colleagues, more than 45% of eighth grade math teachers who participated in a 2000 NAEP professional development survey indicated that they had participated in less than 15 hours of content-focused professional learning in the last year. Yoon and others (2007), however, maintained that professional development that resulted in less than 14 hours of engaged time resulted in no statistically significant effects on student learning. Time in professional learning is important; for positive changes to occur, thirty or more hours of active learning are needed (Yoon et al., 2007). In fact, Yoon and colleagues found that on average, teachers who experienced at least 49 contact hours of professional learning increased student achievement by as much as 21 percentile points (see also Darling-Hammond et al., 2009).

The quality of these hours is also important (Corcoran, Fuhrman & Belcher, 2001; Guskey & Yoon, 2009; Wood, 2007). According to Guskey and Yoon (2009), the length of time provided for teacher learning may not yield changes in teacher and student outcomes "if that time is not used wisely" (p. 497). Although the authors found no specific set of strategies to be used in professional development that were common to studies with changes in student learning, there were consistencies in content. Citing Shulman (1986), Guskey and Yoon maintained that effective professional development for teachers focuses on content and pedagogical knowledge. Furthermore, follow-up which is "structured and sustained" (p. 497) has been linked to changes in teacher and student learning (Guskey & Yoon, 2009).

Joyce and Showers (2002) found differences in professional development strategies on teacher outcomes. In their research on staff development, they found that lecture- or discussion-based professional development resulted in minute attainment of knowledge. Conversely, when presentation of information was coupled with demonstrations and practice in the training

sessions, the level of new or extended knowledge increased significantly (Joyce & Showers, 2002). Knowledge or skill attainment, however, is seldom the goal of professional learning for teachers. Skill transfer is required to change instructional practice (Joyce & Showers, 2002) and, thereby, affect student learning (Vescio, Ross, & Adams, 2008). Unless presentation of theory, demonstration, and practice are combined with peer coaching, transfer of teacher learning to the classroom on a consistent basis is low (Alexander, Murphy, & Woods, 1996; Hord, 1997; Wood, 2007). According to the authors, without the peer coaching component, approximately 5% of trained teachers consistently implement the new skill in the classroom. With the addition of peer coaching, this number rises to 95%.

Regardless of length of service, teachers face significant challenges in the classroom (Darling-Hammond, 1998). With a more diverse student body than ever before and few opportunities to extend their learning, teachers are expected to teach more standards to more students (Darling-Hammond, 1998; Phillips, 2003), providing a base of core knowledge as well as teaching students more "portable skills" such as how to think critically and to synthesize new information (Jolly, 2008). This instructional and pedagogical knowledge must flow from an education received many years prior (Grossman, Wineburg, & Woolworth, 2001; Rosenholtz, 1989a, 1989b), from inadequate, "one-shot" workshops (Phillips, 2003), or from individual efforts to deepen content knowledge or learn new teaching strategies. When left to their own devices, teachers often select professional development that corresponds to their perceptions of "good" instructional practice rather than focusing on evidence (Corcoran et al., 2001; Rosenholtz, 1989a; 1989b). Learning to teach effectively requires teachers themselves to be life-long learners, critically evaluating their own practice and the practice of others (Hollins, McIntyre, DeBose, Hollins, & Towner, 2004).

One promising vehicle with which to deliver high-quality, sustained professional development is the implementation of professional learning communities (PLCs). Empirical evidence in professional literature, however, has been inconsistent in its validation of PLC contributions to student achievement. Unpublished literature in the form of dissertation research has not, to date, been synthesized and examined. The examination of dissertations and doctoral theses from research universities may provide more evidence as to the usefulness of PLCs in helping teachers become more effective in the classroom, and thereby, increasing student achievement.

Conceptual Framework

Some research touts the benefits of creating professional learning communities for students and teachers (Abbate-Vaughn, 2005; Darling-Hammond & Richardson, 2009; Darling-Hammond et al., 2009; Dooner, Mandzuk, & Clifton, 2008; Grossman et al., 2001; Hord, 1997; Hord & Rutherford, 1998; Hord & Sommers, 2008; Kruse, Louise, & Bryk, 1994; Langer, 2000; Little, 1984; Little, 2002; Little, 2003; Phillips, 2003; Rosenholtz, 1989a, 1989b; Saunders, Goldenberg, & Gallimore, 2009; Strahan, 2003; Supovitz, 2002; Supovitz & Christman, 2003; Talbert, 2002; Vescio et al., 2008; Wells & Feun, 2007; Westheimer, 1999; Wheelan & Kesselring, 2005; Wheelan & Tilin, 1999). There is, however, no consensual definition of a PLC (Bolam, McMahon, Stoll, Thomas, & Wallace, 2005; Furman, 1998; Furman-Brown, 1999). PLCs have been conceptualized in various ways with different names, such as teacher communities (Grossman et al., 2001), professional communities (Achinstein, 2002), communities of learners (Furman-Brown, 1999; Grossman et al., 2001), and learning communities (Wood, 2007), just to name a few. Although there are slight differences in the ideology of these groups, these terms will be used interchangeably in this research.

As there is no agreed upon definition of a learning community, there is also no universally accepted model (Lavie, 2006; Westheimer, 1999). There is, however, a growing consensus concerning the essential components of an effective PLC focused on student learning. According to Hord and colleagues (1997, 1998, 2008), there are five critical dimensions of professional learning communities: shared goals and values, shared and supportive leadership, collective learning, shared personal practice, and supportive conditions, which include structural and relational factors. Validating this research, Kruse, Louis, and Bryk (1994) contributed two other terms to the discussion of collaborative teams: reflective dialogue and de-privatization of practice. According to Kruse and colleagues (1994), reflective conversations among teaching professionals bring about shared goals and values, while de-privatized practice corresponds to shared personal practice in the Hord model.

As previously described, research continues to converge on a common conceptualization of professional learning communities which lead to school reform. There is, however, a lack of consensus concerning the effects of this collaboration on student outcomes. Depending on the context, learning communities may focus on any number of teacher or student outcomes, which makes measurement of PLC effectiveness on a large-scale challenging at best.

Superficial implementation (Fullan, 2006; Hord, 1997) compounds the measurement problem. According to the literature, reforms come and go for two reasons: 1) educators do "what we know," or address surface issues which are not the fundamental problem (Alexander, Murphy, & Woods, 1996); and 2) educators do not have a deep understanding of the reform they are trying to implement (Alexander et al., 1996; Hord, 1997; Wood, 2007). In implementing reform strategies, teachers are often not exposed to a deep consideration of the literature undergirding the strategy. This lack of depth in training results in surface implementation that

often falls by the wayside in pursuit of "the next big thing." Limited quantitative research demonstrates that more mature learning communities are tied to higher levels of student achievement (Bolam et al., 2005; Louis & Marks, 1998).

While reform literature attempts to establish a conclusive, quantitative link between PLCs and improvements in student learning (Bolam et al., 2005; Louis & Marks, 1998), social theorists view community as a fundamental goal in its own right (Furman, 1999; Furman-Brown, 1999; Grossman et al., 2001; Lavie, 2006; Sergiovanni, 1994; Shields & Seltzer, 1997), providing the needed meaningful relationships and social bonds human beings require (Westheimer, 1999). Westheimer asserted his own model of community that also included five components: shared beliefs, interaction and participation among members, interdependence, inclusion of minority views, and meaningful relationships. Though similar to Hord's model in some ways, Westheimer's model focuses on the development of community as a goal and the benefits to the whole community, not just to the members of the dominant group (Furman, 1998). Furman-Brown (1999) maintained:

> The value of community needs to be disentangled from instrumental values of improving measurable student outcomes, (e.g., achievement) which seem to pervade contemporary educational policy. This is not to say that the welfare of children in schools is not the primary concern, but that this welfare has many aspects that, as we well know, are not captured in measurable outcomes. Community is really about the quality of day-to-day life in schools. (p. 10)

Others contend (e.g., Furman, 1998; Grossman et al., 2001; Lavie, 2006) that learning to work with those different from ourselves is a desired outcome in a democratic society and that the pursuit of community may be the most important educational outcome for teachers and students. As some communities focus on measurable student outcomes, others concentrate on less visible effects such as equity and social change (Achinstein, 2002; Furman, 1998; Grossman

et al., 2001; Lavie, 2006; Westheimer, 1999). Different models and educational goals result in very different communities and outcomes.

Purpose of the Study

To this point, researchers have not provided conclusive, empirical links between PLC implementation and increased student achievement. To date, only two meta-analyses have been conducted on this topic (Arredondo Rucinski, 2012; Lomos, Hofman, & Bosker, 2011), both of which focused on journal articles. No quantitative analyses have been conducted on doctoral dissertations or theses. To fill this gap, this study analyzed dissertations and doctoral theses that were conducted over the last sixteen years, attempting to establish a quantitative link between PLC implementation and student achievement. Based on dissertation research from 1997-2012, the following research questions were addressed:

1. What is the relationship between the implementation of professional learning communities and student achievement in reading in preK-12 schools;
2. What is the relationship between the implementation of professional learning communities and student achievement in math in preK-12 schools; and
3. What is the relationship between collective efficacy and professional learning communities in preK-12 schools, and the effects on student achievement?

Definitions of Key Terms

Collective efficacy—the perceived judgments of teachers that they can effectively teach students in their charge and overcome the external barriers to their learning (Goddard, Hoy, & Hoy, 2004; Hoy, 2010; Hoy & Miskel, 2008).

Collective learning—all staff members "coming together to study collegially and work collaboratively" (Hord & Sommers, 2008).

De-privatization of practice—a component of professional learning communities exemplified by the opportunities to observe others teaching and where feedback is both offered and accepted (Kruse et al., 1994; Wahlstrom & Louis, 2008).

Effect size—a statistical scale of measurement that "provides a common expression of the magnitude of study outcomes for many types of outcome variables" (Hattie, 2009, p. 8).

Gemeinschaft—a term coined by T□nnies, community exists in its purest sense and relationships are based on intrinsic value (Sergiovanni, 1994).

Gesellschaft—a term coined by T□nnies, where social relationships are based only on a common goal or desire (Sergiovanni, 1994)

Ideology—the beliefs that teachers hold about teaching and learning; which, include ideas about the nature of schooling, school reform efforts, and the relationship of school to society at large (Achinstein, 2002).

Mediating variable—a variable that "explains the relationship between the independent and dependent variables" (Hoy, 2010, p. 34).

Meta-analysis—a method of data analysis "whereby the effects in each study, where appropriate, are converted to a common measure (an effect size), such that the overall effects could be quantified, interpreted, and compared" (Hattie, 2009, p. 3).

Moderating variable—a variable which "affects the direction and/or strength of the relation between an independent and a dependent variable" (Hoy, 2010, p. 34).

Professional learning community—a social organization characterized by a common purpose or shared beliefs and interdependence, where commitment is fostered among members, participation is expected, and all voices are heard (Westheimer, 1999).

Reflective dialogue—a component of professional learning communities where group members share practice through professional dialogue (Kruse et al., 1994; Wahlstrom & Louis, 2008).

Shared and supportive leadership—a component of professional learning communities where power and decision-making are distributed throughout the organization (Hord & Sommers, 2008).

Shared personal practice—a professional learning community process of instructional improvement whereby teachers observe each other, offer feedback, and discuss instructional practice in an atmosphere of trust (Hord & Sommers, 2008).

Student achievement—an outcome that is operationalized by measures of academic achievement performance on criterion-referenced, or other assessments of student learning in reading and math.

Supportive conditions—the structural factors, including the "when, where, what, and how" teachers come together to meet collaboratively in their learning teams, and the relational factors which include the human and professional qualities which promote collegiality (Hord, 1997; Hord & Rutherford, 1998; Hord & Sommers, 2008).

Teacher efficacy—the perception of a teacher that he or she is capable of teaching a student or group of students or is capable of overcoming external motivational barriers to achieve student learning (Hoy & Miskel, 2008).

Transformational leadership—a term originally coined by Burns (1978), the concept was adapted for school leadership by Leithwood and colleagues (Hoy & Miskel, 2008). According to Leithwood, transformational leaders articulate goals and a vision, set high expectations, model

appropriate behavior, foster organizational learning, and provide support for individuals (Leithwood, 1994).

Value-added performance—a way to measure "the relative progress of pupils in a school in comparison to pupils in other schools" (Bolam et al., 2005, p. 49).

Limitations

The limitations of this meta-analysis were as follows:

1. This study included dissertation research from 1997-2012. Since Hord described the concept of a "professional learning community," and adapted its use from the business sector, there should be few, if any, studies conducted in schools prior to her work on learning communities in 1997;
2. Dissertations from research universities only were included in this study;
3. The dissertations included in this study were those available on the dissertation databases such as ProQuest, PsychoINFO, Sociological Abstracts, World Cat, or Educational Resources Information Center (ERIC);
4. Some dissertations may have small sample sizes; and
5. This meta-analysis was limited by the available dissertations. Researchers attempting to link PLCs and student achievement who established no correlation may have omitted this portion of the research.

Assumptions

The researcher made certain assumptions in conducting this research:

1. There was no researcher bias in the dissertation research included in this meta-analysis;
2. The data reported were accurate and mathematically correct; and

3. The identified dissertations provided a sufficient sample of doctoral research to support a meta-analysis of the topic.

Summary

This chapter provided an introduction to the problem of professional learning in the United States and the issues with linking this learning to changes in teacher practice and associated changes in student learning. Many teachers claim that they have few opportunities to engage in the "sustained, intensive, and content-focused" professional learning mandated by No Child Left Behind. As a result, these teachers must rely on the education they received as an undergraduate student or in "sit-and-get" workshops with no follow-up or support. Attempts to embed professional learning in the daily lives of teachers have, in many cases, resulted in superficial and low-levels of implementation of the learning community concept. Where communities do exist, different goals and purposes of these communities have obscured the quantitative connections of PLC implementation to student learning on a large-scale. Because quality teaching is key to student learning, it may be beneficial for teachers to be afforded quality learning experiences to continually hone their instructional skills. Consequently, it is important for researchers to establish whether or not professional learning communities are structures that provide these experiences.

Chapter II of this study provides a review of the relevant literature on professional learning communities, describes in detail competing philosophies of teacher community, and examines the perceived effects of PLCs on teacher practice and student achievement. Chapter III provides an overview of the research design and methodology. Methods of data collection are described as well as the criteria for inclusion in this design. Chapter IV presents an analysis of

the data and the findings of this research. Finally, Chapter V provides a discussion of the results, the limitations, and the implications of the findings of this study on future research and practice.

CHAPTER II:

REVIEW OF THE LITERATURE

Introduction

Ongoing, content-based teacher learning is critical to student learning (Desimone et al., 2006). As the previous chapter illustrated, the quality of professional learning for teachers dictates, to a large degree, the quality of learning that is possible for their students. When teachers fail to pursue life-long professional learning, their students are limited to the instructional strategies these teachers learned in their undergraduate studies (Grossman et al., 2001; Rosenholtz, 1989a, 1989b). In Rosenholtz' study of Tennessee elementary schools (1989a), she found that teachers' mean number of years teaching was negatively correlated with students' reading achievement in grade four. In other words, the more experienced the teaching staff, the less likely students were to achieve to high levels in reading. According to Rosenholtz (1989a), "the emptiness of teachers' professional growth tends to become a numb ache felt in students' learning opportunities" (p. 100).

Professional learning in the form of teacher communities is believed to provide an avenue for teachers to acquire more effective teaching strategies for the challenges they face in the classroom. Chapter II conceptualizes professional learning communities according to the convergence of research literature on the key components of reform-minded PLCs. Hord and colleagues as well as Kruse and others (1994) contributed descriptions of the integral components of learning communities as a means to further teacher and student learning. In Westheimer's model of community based on social theory, he described the five components

considered to be vital for development of community as an important factor in school culture and human development. Both these models are explored in detail.

Several studies have explored the connections of professional learning communities and student achievement. Chapter II presents the findings of these studies and the key factors that may contribute to increased student learning.

Conceptual Framework

A method of professional learning that may hold promise for successful change in schools is the professional learning community (Abbate-Vaughn, 2005; Bolam et al., 2005; Bryk, Camburn, & Louis, 1999; Bryk & Driscoll, 1988; Darling-Hammond et al., 2009; Dooner, Mandzuk, & Clifton, 2008; Grossman et al., 2001; Hord, 1997; Hord & Rutherford, 1998; Hord & Sommers, 2008; Kruse, Louis, & Bryk, 1994; Little, 1984; Little, 2002; Little, 2003; Louis & Marks, 1998; Newmann, 1994; Phillips, 2003; Rosenholtz, 1989a, 1989b; Saunders, Goldenberg, & Gallimore, 2009; Strahan, 2003; Supovitz, 2002; Supovitz & Christman, 2003; Talbert, 2002; Vescio et al., 2008; Wahlstrom & Louis, 2008; Westheimer, 1999; Wells & Feun, 2007; Wood, 2007). Stemming from similar work in the business sector, the concept of a learning community is based on two foundational assumptions (Vescio et al., 2008). According to Buysse, Sparkman, and Wesley (2003), recent theorists have concluded that knowledge is most often encountered in the everyday professional lives of teachers and is fostered through reflective dialogue with others who have similar understandings (Vescio et al., 2008; see also Abbate-Vaughn, 2005; Little, 2002). King and Newmann (2001) contended that most professional development is not productive because it violates the four principles for teacher learning:

1. Teacher learning must provide opportunities for teachers to focus on content strategies within the specific contexts that they teach;

2. Teacher learning must provide sustained learning opportunities where they can receive feedback and support;
3. Teacher learning must provide opportunities for teachers to collectively learn with peers and be provided external sources of expertise;
4. And, teachers must have input into the types of learning to which they are exposed.

Because PLCs address these fundamental tenets of professional development, it is presumed that teachers engaging in professional learning communities will realize positive changes in teaching practice and in student achievement (King & Newmann, 2001; Strahan, 2003; Vescio et al., 2008).

As the perceived need to develop PLCs increases, so do the definitions of what constitutes a learning community (Fullan, 2006; Grossman, et al., 2001; Hord & Sommers, 2008; Wells & Feun, 2007). Bryk and Driscoll (1988) characterized PLCs as social organizations where a common purpose is shared and commitment is fostered among members. Other researchers, (e.g., Westheimer, 1999) defined a PLC as a place where teachers "share beliefs, traditions, and forums in which anyone can participate" (p. 86). According to Westheimer, the community "allows for dissenting views and promotes tolerance and critical understanding of differing opinions" (p. 86). Citing the work of Van Maanen and Barley (1984), Achinstein (2002) characterized a PLC as "a group of people across a school who are engaged in common work; share to a certain degree a set of values, norms, and orientations towards teaching, students, and schooling; and operate collaboratively with structures that foster interdependence" (p. 422).

Theories of Community

Recent research has failed to reach a consensus on the outcomes of PLCs, perhaps because there are different types of professional learning communities with different ideologies (Abbate-Vaughn, 2005; Achinstein, 2002; Lavie, 2006; Westheimer, 1999). Ball (1987) defined ideology as the "educational perspectives and commitments of teachers" (Achinstein, 2002, p. 426). Achinstein referred to ideology as an "underexamined dimension of teacher collaboration" (p. 426) and defined it as the scaffold of mutual beliefs that teachers hold about teaching and learning. Moreover, these ideals include beliefs about school reform and the connections between education and society. The different conceptions teachers have of collaboration (Abbate-Vaughn, 2005; Furman, 1998; Furman-Brown, 1999; Grossman et al., 2001; Lavie, 2006; Sergiovanni, 1994; Shields & Seltzer, 1997; Westheimer, 1999) have influenced the outcomes of their endeavors.

Differences in ideology are obscured by political rhetoric and vague conceptualizations of what constitutes a PLC (Westheimer, 1999). Professional learning communities differ, according to Westheimer, in their "goals, structures, processes, and beliefs" (p. 73) which often result in markedly different outcomes (Achinstein, 2002; Lavie, 2006; Rosenholtz, 1989; Westheimer, 1999). Based on differing ideologies, some learning teams focus their efforts on more superficial topics such as the social aspects of schooling, or more conventional themes of professional development; whereas some groups choose to focus their time on addressing student deficiencies and planning instruction to meet student needs (Bolam et al., 2005; Hipp, Huffman, Pankake, & Olivier, 2008; Hord, 1997; Hord & Sommers, 2008; Langer, 2000; Lee, Smith, & Croninger, 1995; Louis & Marks, 1998; Rosenholtz, 1989a; Saunders et al., 2009; Strahan, 2003; Supovitz, 2002; Supovitz & Christman, 2003; Vescio et al., 2008).

The term “professional learning community” has come to be represented by many various conceptions of community (Fullan, 2006; Lavie, 2006). In his exploration of the different incarnations of PLCs in schools, Lavie described five “discourses” of collaboration which overlap in their characteristics but vary in their purposes: cultural, effectiveness and improvement, community, restructuring, and critical. The first discourse, cultural collaboration, focuses on the positive relationships developed among teachers that transcend professional boundaries to include personal connections as well (Lavie, 2006). Trust develops which orients group members toward cohesion and reciprocal relationships. Teachers’ “habits of mind” transform as patterns of collaboration, focus, and attitudes toward continuous learning evolve (Vescio et al., 2008). Acknowledging the work of Nias (1989), Lavie maintained that this collaborative structure focuses more on the human relationships and teaching culture rather than changes in instructional practice (see also Vescio et al., 2008).

The effectiveness discourse focuses on the principal as a central figure (Lavie, 2006). Principals are the “cultural managers” who lead the charge in developing a shared purpose for the school and setting improvement expectations for teachers and for students (Lavie, 2006; Rosenholtz, 1989a). According to Lavie, there is an emphasis on student achievement and a safe and orderly environment.

Many aspects of the cultural and effectiveness perspectives correspond to the restructuring discourse. The cultural, effectiveness, and restructuring concepts coincide with the conceptions of professional community advocated by current reformists (Bolam et al., 2005; Grossman et al., 2001; Hord, 1997; Hord & Rutherford, 1998; Hord & Sommers, 2008; Kruse et al., 1994; Kruse & Louis, 1997). Restructuring advocates view the purpose of community as the “transformation of schools into workplaces supportive of collective learning and new forms of

professionalism" (Lavie, 2006, p. 789). The cultural, effectiveness, and restructuring discourses of collaboration, or the Hord model, will be explored more in detail in subsequent sections.

The school-as-community discourse refers to collaboration in which true community is advocated (Lavie, 2006). Obligations to others in this collaborative structure are viewed in a "communal v[ersu]s contractual" sense; one in which membership implies responsibilities to others in the group (Grossman et al., 2001). Group members in this communal atmosphere focus on the acceptance of diversity and "an ethic of care" (p. 789), where relationships are meaningful and human needs are satisfied (Furman, 1998; Sergiovanni, 1994; Westheimer, 1999).

For these groups, becoming a community is the goal (Furman, 1998; Furman-Brown, 1999; Grossman et al., 2001; Lavie, 2006; Shields & Seltzer, 1997; Westheimer, 1999). T□nnies (1887/1957) conceptualized two very different types of community: *gemeinschaft* and *gesellschaft* (Furman, 1998; Grossman et al., 2001; Sergiovanni, 1994). He used the terms to describe the shift in human culture from one of "hunting and gathering," to an agrarian society, to the industrial revolution (Sergiovanni, 1994). T□nnies saw society devolving from *gemeinschaft*, true community where relationships are based on intrinsic value, to *gesellschaft*, where relationships are based only on a common goal or desire (Sergiovanni, 1994). After the common goal is reached, the community ceases to exist (Serviovanni, 1994). Reform literature maintains that communities should adhere more to *gesellschaft*, seeking to collaborate to improve teacher practice and student learning. Social theorists, however, call for *gemeinschaft*, and for building community for the sake of community (Furman, 1998; Grossman et al., 2001; Lavie, 2006; Shields & Seltzer, Westheimer, 1999). According to Sergiovanni, schools lie on a continuum somewhere between the two polar concepts of community.

Critical collaboration extends the concept of school-as-community in important ways (Lavie, 2006). According to this mode of discourse, teacher collaboration as a communal endeavor fosters a goal of "social justice" or of creating experiences for students to gain skills in critically analyzing societal norms, becoming better democratic citizens (Lavie, 2006; Grossman et al., 2001; Westheimer, 1999). In these collaborative environments, divergent belief systems are understood and appreciated; participants understand that conflict is a natural and constructive part of collaboration that facilitates growth and change (Achinstein, 2002; Lavie, 2006).

Westheimer's Model

The school-as-community and critical discourses are illustrated in the work of Westheimer (1999). In Westheimer's multiple case study of two middle schools in California over a 15 month period, two very different ideological PLC models were examined. In this study, the sixth grade PLC at Brandeis Middle School chose to focus on "getting along" and supporting one another in his or her professional autonomy and commitment to students. C. Wright Mills Middle, on the other hand, boasted a common mission with shared specific beliefs. This PLC "family" often experienced conflict and navigated it in an open forum to achieve community as an outcome rather than as a means. By examining these two very different schools' conceptions of community, Westheimer brought attention to the fact that ideology can determine the feasibility, sustainability, as well as the outcomes of the learning community (see also Achinstein, 2002; Shields & Seltzer, 1997).

Westheimer developed a model of the five most common features of PLCs according to recent social theorists, which included 1) shared beliefs; 2) interaction and participation; 3) interdependence; 4) concern for individual and minority views; and 5) meaningful relationships. According to Westheimer, shared beliefs were the most common component in PLC literature.

Westheimer cited Addams (1910/1990) and Quarter (1982) in defining shared beliefs as "common ideals and political convictions" (p. 74). What ideals or beliefs should be shared is the concept most avoided in PLC literature (Abbate-Vaughn, 2005; Westheimer, 1999). Most members of the educational circle agreed that members of a PLC share a common purpose; however, Westheimer contended that having a set of common beliefs and a common vision is not enough. The content of the purpose (Achinstein, 2002; Hord, 1997) and how it is elicited are fundamental to this component of PLCs (Westheimer, 1999). This content and process, Westheimer maintained, is the point where the work of developing true learning communities begins.

The next component of learning communities according to Westheimer is interaction and participation. In fact, the researcher declared, a community without interaction is no community at all. Citing the work of Bronfenbrenner (1979) and Fromm (1941), Westheimer asserted that it is through these interactions that humans "satisfy their need for attachment and social bonds" (p. 74). Furthermore, the author maintained that both identity and commitment are fostered within the walls of community.

The third component of community described by Westheimer is interdependence. According to Bellah and others (1985), the term community describes those who participate in both discussion and a decision-making process, sharing "certain practices that both define the community and are nurtured by it" (Westheimer, 1999, p. 75). Interdependence, according to Raywid (1988), Scherer (1972), and Selznick (1992), is defined by reciprocity and shared need (Westheimer, 1999).

The last two components of Westheimer's model diverge from those in the reform literature. Concern for individual and minority views is paramount (Achinstein, 2002, Furman,

1998; Westheimer, 1999). Westheimer asserted that even though members of a community have a common purpose, they do not always agree on certain issues. Acknowledging the studies of Furman (1998), Gardner (1991), Greene (1985), and Selznick (1992), Westheimer argued that even though conflict is inevitable, it can bring about growth within individuals as well as within the group (see also Achinstein, 2002; Grossman et al., 2001; Little, 2002). By providing a means for the exchange of ideas, the perspectives of others are considered and appreciated, bringing about further growth (Furman, 1998; Shields & Seltzer, 1997; Westheimer, 1999).

The fifth component of Westheimer's model of PLCs is meaningful relationships. Citing the work of several social theorists, the author contended that because traditional venues for connectedness have disintegrated, the school alone provides opportunities for this connection and fosters purpose greater than oneself. Coleman, Hoffer, and Kilgore (1982), Gardner (1991), and Noddings (1988) agreed that schools naturally provide a vehicle for community and meaningful relationships (Westheimer, 1999).

As a result of his study of two middle schools in California, Westheimer identified a continuum based on ideology, structure, and processes along which PLCs can be measured. In his study, the author distinguished between two different models of professional learning communities, namely liberal and collective, which lie at different points on the continuum. A liberal ideology, Westheimer maintained, is one that focuses on individual rights and autonomy, functioning in more of a supportive role for the individual. In contrast, he argued, the collective school of thought espouses shared goals and purposes, with community members working together in a more collaborative sense to accomplish those shared objectives.

Westheimer contrasted the liberal and collective ideologies according to eleven characteristics (see Figure 1). The first concept, support of colleagues, is ideologically diverse,

according to the researcher. He argued that liberal community members feel the need to support one another in his or her own individual practice. Collective community members, Westheimer (1999) contended, are led by shared goals and visions and consequently, they work together to accomplish these goals out of a "community-oriented spirit."

Another characteristic of community ideology is that of personal responsibility. In the liberal middle school of the Westheimer study, teachers felt a responsibility for their individual students. Teachers collaborated only when it helped them achieve individual goals. The collective community, he asserted, worked collaboratively in many areas of teaching. Westheimer contended that the teachers at this school worked together not only to accomplish things they could not accomplish alone, but also to engender ideals of community itself such as interaction and interdependency.

The conversations in the PLCs with varying ideologies differ. According to Westheimer, Brandeis teachers shared accounts of teaching strategies and stories about students, neither of which focused on controversial subjects. Their conversations rarely focused on the teachers' philosophy of education or teaching principles. Teachers at Mills, Westheimer continued, frequently explored these issues with group members. According to the researcher, Mills teachers dissected these subjects from their first day together.

Westheimer distinguished between leadership hierarchies. At Brandeis, leaders were appointed, with hierarchy of influence being very important. At Mills, the author contrasted, leadership was ascribed based on ability rather than position. Individuals were known by their strengths and talents, Westheimer asserted. Moreover, Mills' hiring process was quite selective, with applicants being screened by their beliefs about collaboration and joint work. The author

contended that Brandeis had a less selective process with no attention given to teaching philosophy or beliefs.

	Liberal	*Collective*
1.	Community relations are increasingly defined by rights and responsibilities	Community relations are increasingly defined by caring and interdependence
2.	Individual work and responsibility for students, curriculum, and discipline	Joint work and responsibility for students, curriculum, and discipline
3.	Teacher discourse is limited to students, problems,and curriculum ideas and strategies	Teacher discourse includes purposes, principles, and philosphies of education
4.	School management hierarchical; leadership through ascribed title	School management diffuse; leadership through talent recognition
5.	Private (classroom) problems elicit advice and sympathy	Private problems are public responsibilites
6.	Few voices heard in public forums; dissent submerged and when expressed, marginalized	Many voices heard in public forums; dissent drawn out, at times cause for leaving
7.	Sense of instrumental worth of the community	Sense of intrinsic worth of the community
8.	Sense of homogeneity, and conformity within the community	Sense of individuality and identity within the community
9.	Loose hiring criteria based on broad commitments to children and to teaching	Selective hiring criteria based on shared beliefs about collaboration and joint work
10.	Perfunctory faculty activities allow but do not require participation	Structured faculty activities ensure and promote a climate of participation
11.	Curricular goals emphasize personal initiative and individual rights and responsibilities for both teachers and students	Curricular goals emphasize interdependence and collective action among teachers and students

Figure 1. Characteristic Features of Teacher Communities. (Figure used with permission from Sage Publications and Westheimer, 1999.)

When Brandeis teachers had personal problems, the community members offered advice or sympathy. At Mills, Westheimer (1999) described teachers as taking group responsibility for resolving the problems. Moreover, Westheimer continued, disagreements at Brandeis were rarely voiced in the group forum. These issues were more often discussed in informal settings such as the hall or individual classrooms. The researcher described Mills teachers as frequently voicing dissent; and as such a faculty, Westheimer asserted, minority groups were less likely to be marginalized.

According to Westheimer, liberal communities have "structures that allow but do not require participation" (p. 96). He contended that collective communities, such as Mills, promote a culture of interdependency. Furthermore, Westheimer argued that Brandeis' liberal ideology focused on personal goals and individual autonomy. He contrasted this philosophy with that of Mills which focused on "collective action and reflection, and belonging (for both teachers and students)" (p. 96).

When the focus of the learning community is on individual autonomy, there is little opportunity for individuals to find identity in their participation in democratic affairs (Grossman et al., 2001; Westheimer, 1999). As a result, Westheimer contended, the teachers in a liberal community are less likely to achieve this expression. Mills teachers, moreover, in forfeiting their individual autonomy were gaining this collaborative identity, according to the author. Grossman et al. (2001) envisioned the benefits of a democratic community citing that "ultimately the wisdom of the collective exceeds the wisdom of any one individual" (p. 1000).

Teachers with a liberal predisposition have a rudimentary understanding of community roles and responsibilities; whereas those with a collective perspective find these roles and responsibilities instinctive, Westheimer asserted. In his words, "Whereas Brandeis teachers see

community as a means, Mills teachers see it as an end" (p. 95). This latter perspective is often at odds with reformists who advocate community solely as a vehicle to reach organizational goals (Grossman et al., 2001; Westheimer, 1999). Working to understand the perspectives of others and seeking community as a meritorious achievement within itself may be the learning we most want to foster in students (Furman, 1998; Grossman et al., 2001; Westheimer, 1999).

The two middle schools described by Westheimer were not polar opposites in any of the eleven categories he described. The two community stances that these schools took were merely points on the continuum, with other schools falling to the left, right, or somewhere in between (Westheimer, 1999). Researchers have contended that different beliefs of various learning communities produce very different outcomes (Abbate-Vaughn, 2005; Achinstein, 2002; Grossman et al., 2001; Westheimer, 1999). Even though both groups in Westheimer's study valued collaboration, their disparate conceptions of collaboration produced very different results as well (Abbate-Vaughn, 2005; Westheimer, 1999).

Both Lavie and Westheimer distinguished between very different concepts of teacher community. Lavie's (2006) research revealed five broad versions of teacher collaboration that may exist in schools. Even within these broad categories, perceptions of what constitutes "social justice" (Achinstein, 2002; Westheimer, 1999) and promotion of democratic ideals (Grossman et al., 2001) are open to interpretation. Because of the reckless and ubiquitous use of reform terminology in most research, reformists often overlook major differences in types of communities they are analyzing (Lavie, 2006), which results in a moving target for those who would attempt to measure the accomplishments of such communities.

The Hord Model

In spite of the variations in conceptions of PLCs, there has been a growing consensus on the integral components of reformist learning communities which may bring about changes in student learning. Hord and others described the five dimensions of professional learning communities as 1) shared beliefs and values; 2) shared and supportive leadership; 3) collective learning; 4) supportive conditions; 5) and shared personal practice (Hord, 1997; Hord & Rutherford, 1998; Hord & Sommers, 2008; Kruse et al., 1994). Although there are discrepancies among the descriptions, recent theorists have converged on this model of professional learning communities.

Shared beliefs and vision. In every endeavor, the behavior of individuals is guided by their beliefs and values (Hord & Sommers, 2008). It is on this assumption that the first component, shared beliefs and vision, is based. These shared beliefs, values, and vision are what the staff members recognize as their corporate mission or common goals (Hord & Sommers, 2008; Rosenholtz, 1989a). According to Hord and Sommers (2008), this component is directly tied to the teacher's perception of the objective of the school and his or her part in achieving that objective. Furthermore, the authors maintained, as the learning team develops over time, so does a common vision. As each team member communicates his or her vision, a common vision is synthesized, "grounded in trust and mutual understanding" (Hord, 1997, p. 29). This vision leads to behavioral norms (Hord & Rutherford, 1998), which dictate how staff members interact and how they expend their resources (Hord & Sommers, 2008).

Focusing on student learning, PLC members visualize the changes in student achievement they will realize as a result of their efforts. Peters and Waterman (1982) emphasized the importance of shared goals:

> If there is any center to the mystery of schools' success, mediocrity, or failure, it lies deep within the structure of organizational goals: whether or not they exist, how they are defined and manifested, the extent to which they are mutually shared. Indeed, the hallmark of any successful organization is a shared sense among its members about what they are trying to accomplish. (Rosenholtz, 1989a, p. 13)

Citing the work of Louis and Kruse (1995), Hord and Sommers asserted that the core focus of all PLC teams is unwavering attention to student outcomes (see also Bolam et al., 2005; Hord & Rutherford, 1998; Hord, 1997; Kruse, Louis, & Bryk, 1994; Stoll, Bolam, McMahon, Wallace, & Thomas, 2006; Vescio et al., 2008). Since team members are involved in creating the shared vision, they keep this goal at the forefront of their planning, decision-making, and their instruction (Hord, 1997; Hord & Rutherford, 1998; Hord & Sommers, 2008). The vision is shared; however, each staff member is responsible for his or her own actions (Hord & Sommers, 2008). Even though teachers may have personal ambitions, the authors continued, they are in agreement with the good of the organization as a whole. According to Hord (1997), a shared vision "is not just agreeing with a good idea; it is a particular mental image of what is important to an individual and to an organization" (p. 12).

Even though research has shown that common goals are paramount to school success (Abbate-Vaughn, 2005; Bolam et al., 2005; Hord, 1997; Hord & Rutherford, 1998; Hord & Sommers, 2008; Kruse et al., 1994; Stoll et al., 2006), schools diverge in their level of goal consensus based on the social organization of the entity (Rosenholtz, 1989a). Since faculty daily interactions define reality (Little, 2002), the most clearly and consistently articulated goals become ingrained in staff members (Rosenholtz, 1989a). Moreover, Rosenholtz continued, when principals include staff members in developing school goals, socializing new staff members, and developing evaluation criteria, common goals become internalized in the entire faculty, perpetuating goals and practices which bind staff members to the common mission.

Shared and supportive leadership. Any school change must be supported and nurtured by the principal (Bryk, Camburn, & Louis, 1999; Hord, 1997; Hord & Sommers, 2008; Louis & Marks, 1998; Rosenholtz, 1989a; Stoll et al., 2006). Kruse et al. (1994) cited supportive leadership as a necessary social resource to augment professional community. McLaughlin and Talbert (2001) contributed:

> For better or worse, principals set conditions for teacher community by the ways in which they manage school resources, relate to teachers and students, support or inhibit social interaction and leadership in the faculty, respond to the broader policy context, and bring resources into the school. (Stoll et al, 2006, p. 235)

According to Kruse and others (1994), the principal sets the climate for the school. If he or she communicates to the faculty only about procedural or administrative issues, the authors maintained, the faculty is less likely to view quality instruction as the school's primary goal. The effective principal models the behavior that he or she desires to see in the staff (Hord & Sommers, 2008; Leithwood, 1994; Rosenholtz, 1989a).

The concept of shared and supportive leadership refers to one in which the whole organization is learning; one in which problems are identified and then solutions for those problems are sought collaboratively by the principal and teachers (Hord & Sommers, 2008). Prestine (1993) delineated three attributes of principals who were successful in school reform. They have 1) the ability to share decision-making; 2) to support the daily work of the staff; and 3) to "participate without dominating" (Hord, 1997, p. 8). Vescio and colleagues (2008) referred to this concept of shared and supportive leadership as teacher authority where teachers have authority, not only in their professional learning, but in matters of school governance as well. This shared leadership materializes when the principal has trust in his or her staff (Rosenholtz, 1989a) and when teachers exhibit reciprocal trust in the principal (Hord & Rutherford, 1998).

Sarason (1990) acknowledged that many educational reforms fail to materialize because of a lack of attention to the "alteration of power relationships" (Stoll et al., 2006). According to Hord and Sommers (2008), this concept of shared and supportive leadership may be a difficult one for some administrators. They argued that this shared leadership dynamic runs counter to the culture of most schools; it is one in which the principal is willing to relinquish control on both instructional and non-instructional issues. This transition of authority may be difficult for staff members as well as the principal. Carmichael (1982) maintained that teachers have been acculturated to believe that principals are omnipotent and omnicompetent (Hord, 1997). According to Hord and Sommers (2008), the result of this acculturation makes it difficult for teachers to assume more of a decision-making role. In a viable professional learning community, however, the roles of principals and teachers become intertwined and the process becomes more democratic (Hord & Rutherford, 1998; Hord & Sommers, 2008). The principal, along with the teachers, is involved in creating the mission, goals, and vision of the school (Hord, 1997; Hord & Rutherford, 1998; Hord & Sommers, 2008; Rosenholtz, 1989a; Stoll et al., 2006). The teachers share in the decision-making process while recognizing that some decisions are reserved for the principal (Hord & Sommers, 2008). School leadership, principal and team-based, keeps the focus on the school vision of continuous improvement (Kruse et al., 1994; Rosenholtz, 1989a).

Collective learning. The implementation of professional learning teams is evidenced by the participation of all stakeholders: the principal, grade-level instructors, subject area teachers (Rosenholtz, 1989a), and other pertinent individuals who may be outside the confines of the school (Hord, 1997; Hord & Rutherford, 1998; Hord & Sommers, 2008). These professionals come together, not only to work collaboratively, but also to learn collectively (Bolam et al., 2005; Grossman et al., 2001; Hord, 1997, Hord & Rutherford, 1998; Hord & Sommers, 2008,

Rosenholtz, 1989a; Stoll et al., 2006, Vescio et al., 2008). According to Vescio and colleagues (2008), this "continuous teacher learning" is dictated by the needs of the teachers in the group while they make efforts to meet their goals. Acknowledging the work of Louis and colleagues (1995), Stoll and others (2006) asserted that true collaboration means "going beyond superficial exchanges of help, support, or assistance" (p. 227). In a viable community, collective learning is undertaken by the entire staff and is focused on providing higher-quality instruction, which, in turn, leads to better student outcomes (Hord & Sommers, 2008). This collective learning, the authors continued, is "based on collegial inquiry and on reflection by the participants and their dialogue about their reflection" (p. 12).

Collective learning is not just about collaboration; more significantly, the collaboration is focused on a specific need that the learning community hopes to address (Bryk, Camburn, & Louis, 1999; Hord & Rutherford, 1998; Hord & Sommers, 2008; Kruse et al., 1994). During the process of collective learning, the team members identify specific student deficiencies, which, in turn indicate specific skills or strategies that the team members need to learn (Hord, 1997; Hord & Sommers, 2008). The next step, the authors maintained, involves the exploration of various types of professional development, which helps the team learn the desired skills or strategies. Afterwards, the learning team develops and implements a plan to incorporate their newfound knowledge into lesson plans and classroom instruction (Hord & Rutherford, 1998; Hord & Sommers, 2008). Further inquiry and assessment leads the team to determine which revisions should be made to the initial plan or if present strategies should be continued (Hord & Sommers, 2008, Stoll et al., 2006). This cycle of inquiry, learning, and evaluation is continuous in professional learning communities (Hollins et al., 2004; Hord & Sommers, 2008; Rosenholtz, 1989a).

Supportive conditions. For a PLC to be successful, certain supportive conditions appear to be necessary (Hord, 1997; Hord & Rutherford, 1998; Hord & Sommers, 2008; Kruse et al., 1994; Wahlstrom & Louis, 2008). According to the researchers, supportive conditions take on both physical/structural and relational characteristics.

Physical and structural conditions consist of several factors including: the size of the school (Bryk et al., 1999; Lee, Smith, & Croninger, 1995), physical proximity of staff members, modes of communication, and a structured time and location for meetings and for critical reflection (Hord & Rutherford, 1998; Kruse et al., 1994; Kruse & Louis, 1997; Wahlstrom & Louis, 2008). Time is perhaps the most difficult structure to negotiate (Hord & Sommers, 2008; Newmann, 1994). Hord (1997) refers to time as a resource if present and a barrier (Kruse et al., 1994; Kruse & Louis, 1997) if not present.

Teacher empowerment and autonomy are also perceived to be enabling conditions for PLCs (Kruse et al., 1994). Where mature professional learning communities are present, there are high levels of teacher autonomy, according to the researchers. When teachers have more discretion in instructional issues, they feel more accountability for the academic success of the students in their charge (Kruse et al., 1994). This flexibility in instruction allows the teachers to make necessary adjustments as they see fit.

Supportive conditions for PLCs include relational factors. Central to the development of professional learning teams is the concept of trust (Bolam et al., 2005; Bryk et al., 1999; Hord, 1997; Hord & Rutherford, 1998; Hord & Sommers, 2008; Kruse et al., 1994; Rosenholtz, 1989a; Stoll et al., 2006). If trust is to be cultivated in an organization, five facets of trust can be identified (Tschannen-Moran, 2001). According to Tschannen-Moran, someone who will be considered trustworthy must be deemed benevolent, reliable, competent, honest, and open. Hoy,

Gage, and Tarter (2006) described trust as "taking risks and making oneself vulnerable to another in the confidence that the other will act in ways that are not detrimental to the trusting party" (p. 240). They contended that collaboration in an organization is unlikely to materialize if the staff members do not trust one other (see also Hord & Rutherford, 1998; Hord & Sommers, 2008; Kruse, et al., 1994; Tschannen-Moran, 2001). According to Hord and Sommers (2008), trust is required in the PLC process for individuals to give and receive feedback in a positive, productive manner. This trust, however, is developed over time and through interactions that allow individuals to demonstrate trustworthiness.

Trust between colleagues and trust in the principal facilitates openness to innovation (Bryk et al., 1999; Hord, 1997; Kruse et al., 1994); however, trust between teachers appears to be more important in changing instruction and student learning (Wahlstrom & Louis, 2008). Additional capacities which facilitate organizational learning include mutual respect among staff members, a "cognitive and skill base" to teach skillfully, and an effective socialization process for new teachers which perpetuates the behaviors and vision the school is trying to promote (Hord, 1997; Kruse et al., 1994).

Shared personal practice (de-privatized practice). Trust has been described as vital to the development of the fifth component of professional learning communities, shared personal practice (Hord, 1997; Hord & Sommers, 2008). As part of the PLC process, teachers routinely observe each other's lessons, take notes, and give constructive feedback (Hord, 1997; Hord & Sommers, 2008; Kruse, Louis, & Bryk, 1994). Kruse and colleagues referred to this process as "de-privatization of practice" (p. 4). Still others (e.g., Stoll et al., 2006) have classified this dynamic of PLCs as "reflective professional inquiry." As a result of this process, teachers and staff members ensure the implementation of new strategies; and therefore, they become the

catalysts of reform efforts (Hord & Sommers, 2008). If trust is not present between staff members, however, researchers have claimed that the likelihood that mistakes will be admitted or that errors will be perceived as learning opportunities is minimal (Hoy, Gage, & Tarter, 2006). On the contrary, positive relationships develop as a result of this open practice (Hord & Sommers, 2008; Hoy, Gage, & Tarter. 2006). Wignall (1992) maintained that because of these new relationships, teachers develop a new comfort level sharing successes as well as failures (Hord & Sommers, 2008). Several authors have contended that feedback must be offered in an atmosphere of mutual respect to achieve the desired results (Hord & Sommers, 2008).

According to Hord and Sommers (2008), collecting valuable information from classroom observations and provision of constructive feedback are learned skills which have to be supported by professional development. Furthermore, due to the isolative nature of teaching, this dimension of shared personal practice will most likely come later in the collaborative process. According to Hord and Rutherford (1998), shared personal practice is limited even in learning communities where there is a deep level of implementation. Time is a limiting factor, leaving observations "short or casual" and conversations "with little feedback" (Hord & Rutherford, 1998, p. 6).

When PLCs do experience shared personal practice, they explore deeply held, philosophical issues of teaching. This exploration may result in conflicting beliefs and ideas, which bring about opportunities for growth as teachers come to consensus on best practice.

Conflict

Ideological stances toward conflict can influence the outcomes of organizational learning (Abbate-Vaughn, 2005; Achinstein, 2002; Grossman et al., 2001; Darling-Hammond & Richardson, 2009; Little, 2002; Westheimer, 1999). Essential characteristics of PLCs such as

shared beliefs, meaningful relationships (Westheimer, 1999), and group focus can elicit tension and conflict (Dooner et al., 2008; Little, 2002). Little (2002) validated this finding when she described the development of learning communities as the navigation between professional autonomy and community obligation. If and how teachers negotiate this conflict will determine whether they will be guided by inquiry and reflection or if they will strive to maintain the status quo (Achinstein, 2002).

In her study of two urban, public, middle schools, Achinstein found two very different incarnations of PLCs. At Washington Middle, the principal was "conflict avoidant," according to the author, and emphasized quick decision-making based upon consensus. According to the study, the educational ideology of the teachers at WMS was to socialize "students to be productive members of our current society" and to offer "equal opportunities for all to advance based on individual ability" (p. 430). One teacher summed up the school's ideology in one statement, "It's not about changing society. It's about bringing these students' scores up" (p. 431). Washington teachers described conflict as "painful," according to Achinstein; and, as a result, disagreements were seldom aired in the public arena. Dissenters were excluded from the "insiders" (Furman, 1998) and often chose to leave the school, based on teachers' statements (Achinstein, 2002).

Conflict often arises between stated values and demonstrated values (Achinstein, 2002). At Washington Middle, discussions arose regarding how best to handle the 30% of the student population who were at risk of failure or who were behavioral problems. In spite of the school's formal position that "all students can learn," the staff members chose to attribute the academic and behavioral problems to the students and their parents, advocating that these students be removed from classes (Achinstein, 2002). Those teachers who voiced dissent, did so only in

team meetings or in private interviews with Achinstein. During a faculty meeting where troubled students were being discussed, some teachers began to question staff responsibility for this behavior, but the focus of conversation was moved immediately back to the students.

Despite scoring high on learning community measures, the stance toward conflict at Washington Middle was one of avoidance and one that valued harmony and unity of staff members at the expense of those on the "outside," such as the troubled students or dissenters. By transferring the problem onto the students, the teachers at WMS avoided change and instead chose to maintain the status quo (Achinstein, 2002). The conflict between the Washington belief statement of high expectations for all and the disenfranchisement of one-third of the student population was not explored in open forums.

The other school in Achinstein's research was Chavez Middle School, a school which had been sued at one time by the NAACP for providing a substandard education to African American students. In 1989, Chavez was closed briefly for failing to meet standards of improvement, which were terms of the lawsuit settlement. When the school reopened, Achinstein reported, there was a new principal and an almost entirely new staff. The teachers were required to abide by the consent decree that placed responsibility for student achievement and equity on the staff. The principal present in the first year of the study was self-reported "open to conflict," and one of the teachers voiced, "There's plenty of space for dissent here" (Achinstein, 2002, p. 436).

According to Achinstein (2002), the educational ideology of Chavez was geared toward social change rather than socialization of students into the existing framework (Furman, 1998). As a result of this platform, ideological and educational conflicts were discussed in public forums, because as one teacher asserted, "We can't just have the status quo" (p. 436). Teachers

confronted disagreements directly, maintained the author; however, this stance on confrontation left some teachers feeling “stressed” and ready to leave the school. In spite of the slightly elevated turnover rate at Chavez Middle, teachers continued to focus on critical reflection regarding student needs and equity for all students (Achinstein, 2002).

According to Achinstein, Washington teachers scored high on the learning community survey (4.08 out of 5); and, citing Siskin (1994), Achinstein reiterated that current research lauds harmonious communities. These unified communities, asserted Achinstein, are challenged by their own need for consensus that limits their capacity for critical reflection, inquiry, and change. Lima (1998) found that communities based on close relationships often stifle alternative viewpoints, reducing the likelihood that substandard instructional practice will be addressed (Achinstein, 2002). So, often it is not individual teacher beliefs that drive group agendas; it is the belief system of a majority group, which has advanced through time and social interaction (Abbate-Vaughn, 2005; Achinstein, 2002; Furman, 1998). Consequently, the ideological stance toward conflict may be important in distinguishing between PLCs that stagnate and those that are engaged in ongoing inquiry to advance organizational learning (Achinstein, 2002; Bryk et al., 1999).

Little (2002) found conflict in her study of teacher discourse and interactions in communities of practice. In a weekly meeting of the Academic Literacy Group at East High School, the group members were expecting to begin work on the common curriculum for the ninth grade literacy class when one of the teachers posed a question regarding the Silent Sustained Reading (SSR) program. According to the written transcript of interactions, one teacher questioned a decision about whether or not students would be allowed to select their own reading material (Little, 2002). Another teacher who preferred to focus on curriculum

development, tried to curtail the discussion by responding that the discussion of SSR "stresses me out" (p. 923).

The question about SSR was initially regarding what decision had been made and were the others abiding by it (Little, 2002). It soon became, according to Little, a deeper interrogation of whether or not a collective decision should be made regarding the student choice of reading material. Moreover, after a confrontation in which one teacher who wanted to focus on curriculum said she would leave and go work on the curriculum, another teacher appealed "for agreement at the level of broad purpose" (p. 925). If they all agreed that the purpose of the program was to get the students to read for enjoyment, then the teachers could use their own judgment on the details. While debating the merits of a uniform policy, the tension between making a decision about SSR and the perceived need to move on to the curriculum development at the same time initiated group learning while inhibiting it as well (Little, 2002).

Conflict is inherent in the concept of professional community (Achinstein, 2002; Grossman et al., 2001; Little, 2002; Westheimer, 1999). The conflict in the Achinstein study focused on differences in educational ideology; the conflict in Little's research resulted from differences in ideology about teacher autonomy and beliefs about how time should be spent in the PLC session. Community and diversity are rife with conflict (Grossman et al., 2001), and members may choose to address or suppress the issues. To the extent members address the divisive issues may determine if the PLC will achieve purposeful change or if it will reinforce an isolated culture, perpetuating the status quo (Achinstein, 2002; Bryk et al., 1999).

While it has been debated whether community should be the journey or the destination (Furman, 1998; Grossman et al., 2001; Shields & Seltzer, 1997; Sergiovanni, 1994; Westheimer, 1999), most research advocates that professional community be a "means to an end" (Bolam,

2005, p. 10; see also Kruse & Louis, 1997), and that groups should not aspire to "be a professional learning community" (Morissey, 2000, p. 31; see also Hord, 1997). The context of the PLC is much more important than the structure itself. The structure provides the time, place, and consistency; while also promoting the inquiry, action research, and professional dialogue that changes instructional practices. Student achievement does not change unless teaching practices change (Hord, 1997; Hord & Sommers, 2008; Vescio et al., 2008). A focus on student learning drives these changes.

Professional Learning Communities and Student Achievement

In spite of the numerous studies advocating increased teacher collaboration, the search for empirical evidence supporting the creation of learning teams in schools has only recently begun (Bolam et al., 2005; Little, 2003; Louis & Marks, 1998; Vescio et al., 2008). There are "pockets of excellence" where student achievement has been linked with teacher participation in learning communities; however, these cases are few in number and most rely on case study or quantitative data with small sample size (Little, 2002; Louis & Marks, 1998; Moolenaar, Sleegers, & Daly, 2011; Saunders et al., 2009; Vescio et al, 2008; Wahlstrom & Louis, 2008).

There are many possible reasons why teacher work in professional community has failed to produce measurable changes in student learning on a large scale. The philosophies of learning communities vary in purpose (Achinstein, 2002; Furman, 1998, Furman-Brown, 1999; Lavie, 2006; Shields & Seltzer, 1997; Sergiovanni, 1994; Westheimer, 1999), focus, and model (Bryk, Camburn, & Louis, 1999; Bolam et al, 2005; Hord, 1997; Hord & Rutherford, 1998; Hord & Sommers, 2008; Kruse et al., 1994; Kruse & Louis, 1997; Westheimer, 1999). Learning communities also reach different levels of implementation (Bolam et al., 2005; Louis & Mark, 1998; Wheelan & Tilin, 1999), which results in different outcomes for student learning. And as

Fullan (2006) asserted, many educators are using the term "learning community" in so many different contexts that the term has lost meaning. To this point, researchers have failed to "distinguish between a community of teachers and a group of teachers sitting in a room for a meeting" (Grossman et al., 2001, p. 943; see also Darling-Hammond, 2009; Rosenholtz, 1989a). Because of limited resources and high stakes testing, Vescio et al. (2008) maintained, "understanding the outcomes of these endeavors on teaching practice and student learning is crucial" (p. 81).

Focus on Student Learning

For PLCs to produce increases in student achievement, there has to be a focus on student learning (Hord, 1997; Hord & Sommers, 2008; Kruse et al., 1994). In the mixed methods study of Hipp and colleagues (2008), the authors attempted to identify how two schools with emerging PLCs influenced the learning cultures for both teachers and students. Initially part of a Southwest Educational Development Laboratory's (SEDL) project, the schools continued to develop as PLCs even after the project ended in 2000, changing the culture of adult learning to improve student learning. Cultures in which the characteristics of learning communities are exhibited over time, the authors contended, demonstrate increased teacher learning as well as associated increases in student achievement.

The two schools in the study exhibited growth and sustainability in student success despite the differences in school and community context (Hipp et al., 2008). Although Lake Elementary and Galena Park Middle School were similar in number of students, number of instructional staff, and student attendance percentages, the authors contended that there were major discrepancies in socioeconomic status and the percentage of students who were limited in English proficiency. Lake Elementary boasted a free and reduced lunch percentage of only 26%

while Galena Park Middle was over 75% economically disadvantaged. Differences in the ethnic makeup of the schools were also exhibited, with Lake's composition being primarily White (97.9%) while Galena Park was primarily Hispanic (86.6%).

In spite of these differences, Hipp and colleagues maintained that both schools continually demonstrated high achievement on state mandated assessments. As illustrated in Table 1, Galena Park Middle demonstrated significant gains in student achievement between 1995 and 2002. Even though they were already doing PLC type activities before the SEDL project in 1998, they maintained the initiative past the conclusion of the project in 2000, demonstrating significant gains in student achievement in reading, writing, and math.

Although the two schools were very different in demographics, there were some similarities in their collaboration (Hipp et al., 2008). They both held student success as the primary goal, moving "beyond making decisions for teachers to a template that used students and student learning in all its forms (cognitive to social) as the driver" (p. 191). According to Hipp and colleagues, teachers at both schools examined student work, had a common focus on "learning and the curriculum" (p. 182), and valued student learning beyond the results on standardized tests.

Table 1

Galena Park Middle School: TAAS Test Scores

Galena Park Middle School	1994-1995	2001-2002
Reading	61.5%	89.8%
Writing	73.0	91.2
Math	37.3	94.4

*Table used with permission from Springer and Hipp, Huffman, Pankake, and Olivier (2008).

Another study conducted by Lee, Smith, and Croninger (1995) described the findings from the Center on Organization and Restructuring of Schools on 820 secondary schools across the nation that were considered to be functioning as learning communities. The teachers who participated in PLCs were working collaboratively to change their teaching practices, providing more intellectually challenging work for their students, and ultimately, having their students make greater gains in math, science, history and reading than their counterparts in schools which were not functioning as PLCs. According to Lee and colleagues, learning was distributed more equally in these schools, causing achievement gaps to decrease.

Langer (2000) analyzed teacher characteristics that accompanied increased student performance in the language arts. She found that in the 25 schools attempting to increase literacy among students, 14 schools were achieving in spite of the poor and low-achieving student populations they served. During her five-year study, she identified characteristics of the 14 high achieving schools, which were not present in the eleven more typical schools, which functioned more like schools with similar demographics. The successful schools fostered a culture that:

1. orchestrated coordinated efforts to improve student achievement;
2. fostered teacher participation in a variety of professional communities;
3. created structured improvement activities in ways that offered teachers a strong sense of agency;
4. valued commitment to the profession of teaching;
5. engendered a caring attitude to colleagues and students; and
6. fostered a deep respect for lifelong learning. (p. 397)

These characteristics were present regardless of school level.

Despite calls in research to change teachers to affect student learning (e.g., Hord, 1997), Langer (2000) advocated changing the setting. In many cases, the larger system is responsible for "how teachers behave and grow as professionals" (Langer, 2000, p. 435). Policies and goals set outside the confines of the classroom, Langer maintained, can facilitate or inhibit student learning.

Mirroring Langer (2000) in a three-year study of three elementary schools which "beat the odds" in student achievement, Strahan (2003) found schools which had strengthened their collaborative cultures to effect changes in instruction. Even though the schools had initiated reform efforts in different ways, there were similarities in their restructuring efforts. Dialogue became "data-driven," targeting areas for improvement (Strahan, 2003). Grade-level meetings, according to the researcher, became a forum for identifying student needs, developing strategies to address those needs, and providing the professional learning that teachers required to link their efforts to the classroom. They continually assessed their efforts through formal and informal assessments (Strahan, 2003). As student performance increased, teachers shared their successes, which transformed the teaching cultures and norms of their schools.

As a result of their efforts, these three North Carolina Lighthouse schools saw their student achievement scores in reading and math increase significantly (Strahan, 2003). The percentages of students in third, fourth, and fifth grades who performed at or above grade level in reading and math increased 24 to 36 percentage points at each school in the study. The average change in percentage of students performing on grade level in both reading and math from 1997 to 2002 for the three schools was almost 30 percentage points (Strahan, 2003).

Rosenholtz' (1989a) study of learning-enriched and learning impoverished elementary schools in Tennessee revealed connections between teacher and student learning. The

quantitative data revealed that student achievement in reading was negatively associated with both socioeconomic status and mean teacher experience (see also Rosenholtz, 1989b). Further analysis revealed that the latter obstacle could be overcome with teacher learning opportunities (Rosenholtz, 1989a: 1989b). The author found that with greater learning opportunities for teachers came increases in student achievement in both math and reading. According to Rosenholtz, these learning opportunities for teachers were influenced by instructional goal-setting activities, principal evaluation, shared instructional goals among teaching staff, and teacher collaboration that "at once enables and compels teachers to offer and request advice in helping each other improve instructionally" (Rosenholtz, 1989a, p. 103).

Phillips (2003) focused research efforts on an urban, magnet middle school in Texas. At first glance, the school seemed to be successful; however, further investigation revealed that the "regular," non-magnet students were not experiencing the same success as their counterparts in the magnet program (Phillips, 2003). As a result, school leaders focused on facilitating teacher learning which they hoped would foster associated increases in learning for all students. The author described five themes that were key to the school's improvement. These included a focus on teacher learning, research grounded in literature, distributed leadership, teacher collaboration, and culturally relevant programs. Because the staff knew their students, they could create programs for improvement that were tailored just for their students (Phillips, 2003). As a result of their efforts, Woodsedge Middle students' scores on the Texas Assessment of Academic Skills (TAAS) increased. In just three years, the school progressed from having only 50% of their students pass all subtests on the TAAS to having at least 90% of students pass each subject area.

Goddard, Goddard, and Tschannen-Moran (2007) found that teacher communities are associated with increased student performance on reading and math standardized tests. In their

study of teacher participation in PLCs and fourth grade student scores on summative assessments, they found differences among schools in both reading and math achievement based on teacher participation in the collaborative groups. The authors surmised, however, that the results of their study were quite possibly indirect (see also Bryk et al., 1999). Goddard and colleagues proposed that the effects might be attributed to either change in teacher practices or to increased teacher learning.

Indeed, to produce effective PLCs, there must be a consistent focus on teaching practices which affect student learning (Bolam et al, 2005; Strahan, 2003; Supovitz, 2002; Supovitz & Christman, 2003; Vescio et al., 2008). Supovitz and Christman (2003) found that two features of learning communities are essential to student learning: teams must be focused on instructional practices, and teams must be provided the structures and supports to connect instructional practices with student learning. In the study, the only teams that experienced reform in instructional culture were the teams that focused on an instructional intervention, such as the district-wide literacy initiative or the Education Trust's Standards in Practice (SIP) program. Qualitatitive data obtained by the researchers indicated that the community reforms failed to improve instructional focus in many teams because:

1. they spent little time discussing teaching practices or planning lessons;
2. discussions of instructional matters were usually a "one-way transmission" of information; and
3. only a few teams moved to higher levels of group practice in which they began to analyze teaching practices in relation to student work.

In both Philadelphia and Cincinnati, teams which experienced "structured, sustained, and supported instructional discussions" and which made connections between teaching practices and

student work samples, realized significant gains in student achievement (Supovitz & Christman, 2003).

In Cincinnati, there was no significant difference between the standardized test scores of students in team-based schools and those of students in non-team-based schools (Supovitz & Christman, 2003). Students of teams who participated in SIP, however, did experience higher achievement. Holtzapple (2001) found that students of teams who participated in SIP experienced higher student performance than students of any other group of teams: those who did not participate in SIP, those who participated in SIP but not teaming, and those who did not participate in teaming or SIP (Supovitz & Christman, 2003). This evidence indicates that teams, or communities, provided the structures necessary for instructional investigations, but these structures alone did not move teachers to higher levels of instructional practice (Supovitz & Christman, 2002).

Supovitz (2002) found that teacher communities in Cincinnati often did not focus on instructional issues, instead using the provided time to complete district or school mandates. As a result, only a quarter of teams reached high levels of group implementation. Supovitz asserted that these teams didn't develop into communities focused on instruction because they had no models or experiences that what would help them "engage in the disciplined investigations necessary" (p. 1616). According to the researcher, the provided training focused only on team processes, not the process of investigation that is necessary to connect instructional practices with student performance. These results suggest that models or programs may be necessary to provide the coaching for teachers to address content standards, instructional practices, and the resulting student performance (Supovitz, 2002).

Focusing on student learning may be difficult when beliefs are not shared, especially in high school departments. According to Visscher and Witziers (2004), teachers who work in the same content department may hold differing conceptions of the course they teach. As a result, conflict arises which may serve as a barrier to collaboration in high school settings. In their study of high school math departments in The Netherlands, these researchers found the levels of collaboration in these units "disappointing," and asserted that "[m]ath departments should be characterised as mechanical units aimed at increasing efficiency rather than professional communities aimed at developing teachers and improving education" (p. 797). Visscher and Witziers maintained that the basic tenets of shared goals, decision-making and collaboration may not be adequate to make sufficient change in student outcomes in high schools. To realize changes in student achievement, they asserted that teams must focus on improving the quality of instruction. Through a process of creating explicit teaching priorities, developing shared goals, and delivering mutual feedback, student achievement may be increased (Visscher & Witziers, 2004).

Lee and Smith (1996) did see changes in high school settings. They examined a national database of 11,692 high schools drawn from the National Educational Longitudinal Study of 1988 (NELS:88) to investigate the constructs of collective responsibility for student learning and teacher collaboration. The authors found that student achievement was significantly higher in schools where teachers took collective responsibility for student learning. Additionally, in schools where teachers took collective responsibility for learning, achievement gaps between student subgroups were less pronounced (Lee & Smith, 1996). The authors also found student learning gains to be higher among staffs that worked cooperatively. Considering the variation in

high school teachers' beliefs about the ability of some students to learn, this finding has major implications toward student learning in secondary schools (Lee & Smith, 1996).

External Assistance

For teachers, learning how to work in teams is not always inherent (Thessin & Starr, 2011). Teachers often require external assistance in acquiring the skills to navigate their own learning (Corcoran et al., 2001; Guskey & Yoon, 2009; Morrisey, 2000; Supovitz, 2002; Supovitz & Christman, 2003; Yoon et al., 2007) as well as protocols and templates to structure the process (Thessin & Starr, 2011). In their district implementation of PLCs, Thessin and Starr found that the teachers' capacity to conduct group work before the implementation of teacher communities greatly influenced the growth of their PLCs. As a result of their research, the authors asserted that this capacity should be assessed before teachers are placed in groups and experience frustration (see also Morrisey, 2000). After such an assessment of teacher group learning needs, differentiated support for teacher communities may be necessary (Thessin & Starr, 2011).

As a result of their research, Thessin and Starr found strong improvements in student learning. Results from the 2009 Connecticut Mastery Test indicated that student performance improved in math in grades 6 and 8, in reading in grades 5 and 8, as well as writing in grade 8 (Thessin & Starr, 2011). According to the authors, dissagregated data also demonstrated "higher overall achievement in the percentage of students scoring at or above 'goal' when compared to students' performance statewide" (p. 53). Moreover, in 2010, the district saw continued increases in student performance for grades 3, 5, and 8 math. For the time period indicated in their research, Thessin and Starr found that student math scores had improved overall by 13% in grade

5 and by 15% in grade 6. The teachers attributed this success to their time spent in PLCs where discussions of best practice evolved (Thessin & Starr, 2011).

It is the quality of conversations in communities that facilitates changes in teacher and student learning (Wood, 2007). In her study of a mid-Atlantic district that implemented learning communities (LCs), part of the training for the LCs included the use of protocols. The purpose of the protocols was to help structure the limited LC time and provide focus for the professional conversations (Wood, 2007). There were multiple protocols that structured the time for presentation of teaching issues, clarifying questions, and recommendations, delineating those who would speak and those who should listen. These protocols became pervasive, not only in the LCs but also in faculty meetings and classrooms.

According to Wood, the protocols became problematic. Due to the rigorous structure, the protocols tended to lead teachers to a quick consensus rather than fostering collegial inquiry and questioning of idealogical stances (Wood, 2007). Protocols also failed to lead participants to search for external expertise that might be needed to facilitate teacher and student learning. In many schools, these protocols became the content of the meeting instead of the tools to navigate it (Wood, 2007). As a result, many schools in the study failed to see changes in student performance.

Indeed, the key to successful collaboration is in structured conversations about student learning (Hollins et al., 2004). In their study of an urban, low-performing, high poverty elementary, the authors utilized a study group approach to promote teacher learning. This five-step approach focused on developing teachers' "habits of mind" which would increase student literacy. These steps to more productive dialogue included:

1. delineating challenges;
2. identifying approaches for meeting challenges;
3. implementing selected approaches;
4. evaluating implementation; and
5. formulating theory to guide future practices. (Hollins et al., 2004, p. 255)

During the first year of the study, a graduate student served as an external facilitator who helped keep the group focused. There was a different external facilitator the second year, and the principal graduated to the role after the third meeting.

As a result of the focused dialogue and subsequent changes in teaching practices, student reading scores on the *Stanford Achievement Test, Ninth Edition (SAT-9)* increased significantly over the course of three years (Hollins et al., 2004). The most significant changes, the researchers maintained, came from the poorest readers in the second and third grades. Students scoring above the 25th percentile in 1998 increased from 48% to 73% in 2000. There were similar gains for third grade (Hollins et al., 2004). According to the authors, third graders scoring above the 25th percentile in reading increased from just 32% to 63% in three years. Hollins et al. (2004) credited the study group collaboration with the changes in student literacy.

In a case study of a rural school in North Carolina, Berry Johnson, and Montgomery (2005) analyzed how this elementary used the expertise of National Board-certified teachers and a consultant from a regional education laboratory to develop professional communities to increase student achievement. The teams were created to find solutions to problems that surfaced in a critical analysis of the school's data (Berry et al., 2005). Using protocols to facilitate decision-making, the teachers researched solutions to their instructional issues and talked about their practice. Ultimately, the school schedule was reworked to allow for common planning

times to further this professional discussion (Berry et al., 2005; Rhyne, 2011). As a result of their efforts, staff members at this school saw the percentage of their students "at or above grade level" go from 56% in 2000 to 83% in 2004 (Berry et al., 2005).

Extensive external expertise may be needed to produce effective teacher communities that facilitate positive changes in student performance (Louis & Marks, 1998). In their study of 24 nationally-selected restructuring schools, Louis and Marks focused on the intellectual quality of student work, or authentic achievement, and the mediating effects of teacher community. Authentic achievement requires that students be able to "demonstrate an ability to analyze and interpret knowledge and to engage disciplinary concepts (e.g., from social studies, mathematics, science) in depth, using elaborated written communication" (p. 536). The depth of knowledge rather than the content is paramount (Louis & Marks, 1998). Higher order thinking, meaning elicited through conversation, and connections of learning to the real-world embodies authentic achievement (Louis & Marks, 1998; Vescio et al., 2008).

Results of the study indicated that professional community was more characteristic of elementary schools than of secondary schools, by at least a standard deviation (Louis & Marks, 1998). The researchers found that where professional community is perceived to be present, authentic pedagogy is also likely to be increased. According to Louis and Marks, teacher community was related to increased authentic achievement and social support for achievement among students, who learned to work together to achieve to a new level. Professional community and social support for achievement, however, were explained by authentic pedagogy (Louis & Marks, 1998). According to Louis and Marks, teachers changing from more traditional instructional methods to more authentic pedagogy may require external assistance (see also Mullen & Hutinger, 2008).

Principal Leadership

Principal leadership is paramount, both to teacher community and student learning (Bryk, Camburn, & Louis, 1999; Friedkin & Slater, 1994; Hord & Sommers, 2008; Leithwood, Louis, Anderson, & Wahlstrom, 2004; Louis & Marks, 1998; Morissey, 2000; Rosenholtz, 1989a; 1989b; Wahlstrom & Louis, 2008; Wiley, 2001). Principal influence, in fact, is second only to teacher influence in mediating student learning (Leithwood, Day, Sammonds, Harris, & Hopkins, 2006). Professional literature suggests that low-performing schools must experience effective leadership to become more successful (Hallinger, 2003; Leithwood et al., 2004; Leithwood et al., 2006; Leithwood & Strauss, 2009; Thoonen, Sleegers, Oort, Peetsma, & Geijsel, 2011). Based on context, research suggests that some types of principal leadership influence student achievement more than others (Bryk, Camburn, & Louis, 1999; Hallinger, 2003; Hattie, 2009; Leithwood et al., 2004; Leithwood & Jantzi, 2005; Louis, Dretzke, & Wahlstrom, 2010; Wiley 2001). In elementary schools, transformational leadership has been found to be positively correlated with student achievement (Wiley, 2001). Transformational leadership has also been positively linked with increased student engagement (Leithwood et al., 2006).

Originally coined by Burns (1978), the term “transformational leadership” has been adapted by Bass (1985) for use in social organizations, and by Leithwood in school settings (Hoy & Miskel, 2008). Transformational leadership encourages organizational innovation (Hallinger, 2003; Ross & Gray, 2006b; Thoonen et al., 2011). According to Hoy and Miskel (2008), transformational leaders inspire followers to achieve at unprecedented levels. Moreover, transformational leadership encourages participation in professional learning and increases teacher motivation (Thoonen et al., 2011).

Bass and Riggio (2006) identified the four "Is" of transformational leadership: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration (Hoy & Miskel, 2008). Leithwood (1994) and Leithwood and Jantzi (2005) adapted these dimensions into a set of transformational leadership behaviors that correspond more readily to a school context. According to the authors, a transformational leader:

1. Identifies and articulates a vision;
2. Fosters the acceptance of group goals;
3. Conveys high performance expectations;
4. Provides appropriate models;
5. Facilitates intellectual stimulation; and
6. Provides individualized support. (Leithwood, 1994, p. 507)

Leithwood also identified two other dimensions of this model: distributing leadership through shared decision-making and building a collaborative culture.

In Leithwood and Jantzi's (2005) review of the literature on transformational leadership, they found that evidence linking transformational leadership behaviors and student achievement was positive, but inconclusive. In a study of student performance in math in U.S. high schools, however, Wiley (2001) found that transformational leadership interacted with teacher community to significantly affect student achievement. She found that professional community had significant effects on student learning in math only in the presence of "above average" transformational leadership. Transformational leadership, on the other hand, positively influenced student outcomes even with minimal teacher community present (Wiley, 2001).

According to Wiley, transformational leaders affect student outcomes by facilitating the development of shared goals and values and by encouraging work toward instructional

improvement. Friedkin and Slater (1994) validated this stance when they found that teacher networks were not linked to increases in student learning apart from principal leadership. One possible implication from this research is that when strong leadership is not present, teachers may not focus their collaboration on instructional improvement, rather choosing to focus on "other concerns" (Wiley, 2001).

Indeed, schools with transformational leaders have been associated with many positive outcomes such as "greater teacher commitment to school mission, school community, and school-community partnerships, and higher student achievement" (Ross & Gray, 2006a). Ross and Gray (2006a) found that the experience of transformational leadership inspires organizational members, causing them to go beyond personal ambitions to reach the school vision. Positive changes in organizational learning, effectiveness, and culture were also explained by transformational leadership (Ross & Gray, 2006b). Although Ross and Gray (2006a) found no significant direct effects on student achievement, they found that "[i]ncreasing the transformational leadership practices in schools by one standard deviation would increase student achievement in grade-3 and -6 reading, math, and writing by 0.22 standard deviations" (p. 812). The strength of this relationship was explained by the influence of transformational leadership on collective efficacy, which influenced teachers to foster teacher-community relationships (Ross & Gray, 2006a. 2006b). Although professional community was positively and significantly related to collective efficacy, there was a negative, insignificant correlation of community to student achievement in this study (Ross & Gray, 2006a). Ross & Gray (2006b) found that for every increase of one standard deviation in transformational leadership, one could expect a 0.64 standard deviation increase in professional community. Since transformational leadership has been linked to both collective efficacy and professional community, further

research is needed to substantiate these claims, though these relationships will not be explored in this particular study. There appears to be a well-established link between collective efficacy and student achievement in professional literature (e.g. Bandura, 1993; Goddard, Hoy, & Hoy, 2000), and these relationships, in conjunction with professional learning communities, were examined.

Collective Efficacy

According to social learning theory, perceived self-efficacy is the judgment of one's ability to execute certain courses of action (Bandura, 1982). This efficacy perception involves both the assessment of the external barriers to the task and one's competence in accomplishing the task (Goddard et al., 2000; McCoach & Colbert, 2010). This efficacy construct has been extended both to individual teachers, in perceived teacher efficacy, and to the school, in perceived collective teacher efficacy (Goddard et al., 2000; Hoy, 2010; Hoy & Miskel, 2008). Perceived teacher efficacy is defined as the belief of individual teachers that they can succeed in affecting student achievement (Ross & Gray, 2006b), whereas perceived collective teacher efficacy, or collective efficacy, is defined as the judgments of the aggregate as to their capabilities of affecting student learning (Goddard et al., 2000; Goddard et al., 2004; Hoy, 2010; Hoy & Miskel, 2008).

According to Bandura (1982), efficacy perception is based on four types of experiences: mastery, vicarious, verbal persuasion, and affective states. Mastery experiences are the most influential (Bandura, 1982; Goddard, 2001; Goddard et al., 2004). The perception of a successful task performance raises the belief that one can do it again (Goddard et al., 2004) and perception of failure lowers efficacy, especially where significant effort was exerted (Bandura, 1982). Vicarious experiences increase efficacy beliefs (Bandura, 1982; Goddard et al., 2004). When

those who are similar model the skill and are successful, others believe that they too possess the skills to be successful (Bandura, 1982; Goddard et al., 2004).

Verbal persuasion may be used to increase efficacy (Bandura, 1982; Goddard et al., 2004). This experience may include encouragement or feedback from a supervisor (Goddard et al., 2004). According to Bandura (1982), this encouragement will be more successful if it is realistic in nature. At the organization or school level, verbal persuasion may take the form of socialization of colleagues, or verbalized expectations that staff members exert effort to reach organizational goals (Goddard, 2001; Goddard et al., 2004; Hoy, 2010).

Physiological or affective states influence perceptions of efficacy (Bandura, 1982; Goddard et al., 2004). When feelings of stress or anxiety are felt, it is read as "an ominous sign of vulnerability to dysfunction" (Bandura, 1982, p. 127). As stress or anxiety tends to impair ability to succeed, an individual is more inclined to expect success and perform optimally when not affectively aroused (Bandura, 1982; Goddard et al., 2004). These four types of efficacy experiences are based solely on perception (Goddard et al., 2000). If one was successful in completing a task but viewed the success as "good luck," then the task completion is not viewed as mastery. Moreover, feelings of efficacy affect teachers' willingness to take risks or try new things (Goddard et al., 2000; Goddard et al., 2004; Hoy, 2010; Ross & Gray, 2006b; Wahlstrom & Louis, 2008)

Collective efficacy has been empirically linked to student achievement in reading (Moolenaar et al., 2011) and math (Bandura, 1993; Goddard, 2001; Goddard et al., 2000; Goddard et al., 2004; McCoach & Colbert, 2010). Even though some studies found school demographic factors to be powerful predictors of student achievement (Hoy, Gage, & Tarter, 2006; Moolenaar et al., 2011), Bandura (1993) concluded that student body characteristics

influence student achievement primarily through influencing faculty collective efficacy beliefs. According to Bandura (1993), the higher the percentage of minority students who were economically disadvantaged, the lower was the collective efficacy of the school, and consequently, student achievement was lower.

In attempting to connect professional community to student achievement, Moolenaar and others (2011) found no direct affects of "advice networks" to student learning. They did, however, find that the networks increased collective efficacy, which in turn increased student achievement in language. In this particular study, school SES proved to be a stronger predictor of student achievement than did collective efficacy.

Another study did establish a connection between professional community, collective efficacy and student achievement (Bruce, Esmonde, Ross, Dookie, and Beatty, 2010). In the study of 46 elementary schools in two districts, the researchers found that in the beginning of the program, District B had higher collective efficacy perceptions and higher student achievement than did District A on the pretests. After implementation of the program, District A had higher collective efficacy perceptions and higher student achievement scores than District B. The changes were ascribed to District B's more superficial implementation of the program, focusing on the lesson format and changing from a book focus to a curriculum focus. As a result of District A's prior experience with reform-based mathematics, they focused on deeper implementation of the program. District A teachers were also observed implementing lessons and co-planning outside the required days of the program (Bruce et al., 2010).

In the end, teachers in District A changed their practices, which resulted in changes in student achievement (Bruce et al., 2010). These changes in student achievement resulted in mastery experiences that raised teacher perceptions of collective efficacy, which pushed them to

work even harder to affect student learning (Bruce et al., 2010). Teachers in District B made minimal changes in practice that resulted in no change in student achievement. Their initial high perceptions of collective efficacy were based on "untested self-appraisals" (p. 1607). Because they did not have the background in math reform that District A did, they did not realize their instructional practices were at a lower level. This research connects professional community endeavors to collective efficacy, which is believed to mediate effects on student achievement (Bruce et al., 2010).

Levels of Implementation

Research comparing teacher collaborative teams at different levels of collegiality have indicated that groups at higher levels of collaboration see greater changes in student learning (Bolam et al., 2005; Wheelan & Tilin, 1999). In Wheelan and Tilin's study investigating the relationship between perceived levels of professional community and actual levels of student achievement, they found a strong link between group functioning and student learning. Consequently, groups with higher perceptions of group collaboration had higher student performance than groups with lower levels of group collaboration (Wheelan & Tilin, 1999). Moreover, schools that were classified as "High" on student achievement measures reported less conflict and division among staff and higher levels of trust and structure than schools who were classified as "Low" on assessment measures. According to the authors, high-ranking schools also enjoyed higher levels of parental involvement.

Bolam and colleagues (2005) perhaps conducted the most extensive study of professional learning communities and student learning outcomes to date. With no correlation values higher than 0.3, the results while weak, were encouraging. Among their main conclusions:

1. teacher participation in PLCs was empirically linked to student learning when using value-added measures;

2. teacher and student learning varied according to the strength of the learning community; and

3. these findings were statistically significant across elementary and secondary schools in England (Bolam et al., 2005).

Summary

Hord (1997) contended that it is "not simply the presence of the learning community but what the community chooses to focus on that influences the outcome" (p. 26). Moreover, Hord argued that the success of a learning community depends on what the team does in their collaborative work. Those seeking community as a destination (Achinstein, 2002; Furman, 1998; Furman-Brown, 1999; Grossman et al., 2001; Lavie, 2006; Sergiovanni, 1994; Shields & Seltzer, 1997), as well as those using it as a vehicle to increase student achievement, agree that having a common purpose is not enough (Westheimer, 1999). This purpose must be fundamentally shared by all members of the community, with all members having a voice that is heard and appreciated (Achinstein, 2002; Furman, 1998; Grossman et al., 2001; Lavie, 2006; Sergiovanni, 1994; Shields & Seltzer, 1997; Westheimer, 1999). Without this voice, conflict and diversity are stifled, often resulting in the maintenance of the status quo and substandard teaching beliefs and practices (Achinstein, 2002). Addressed conflict can bring about individual as well as group growth.

Research indicated that increased student achievement is possible with teachers collaborating in professional learning teams. The studies included in this research indicated that successful teams focus exclusively on student learning, changing instructional practices to those that have proven to be effective with students in the team's particular context (Goddard et al., 2007; Hipp et al., 2008; Langer, 2000; Lee et al., 1995; Phillips, 2003; Rosenholtz, 1989a, 1989b; Strahan, 2003; Supovitz, 2002; Supovitz & Christman, 2003; Vescio et al., 2008). At

times, professional learning teams may not possess the skills to change ineffective practices and may need external sources such as facilitators or programs to provide assistance (Berry et al., 2005; Hollins et al., 2004; Louis & Marks, 1998; Thessin & Starr, 2011; Wood, 2007). Capacity of learning teams to conduct in-depth inquiries into best practice must be assessed to ascertain if help is needed (Thessin & Starr, 2011).

The effects of professional collaboration on student achievement may be mediated by leadership behaviors and actions (Ross & Gray, 2006a, 2006b; Wiley, 2001), or by collective efficacy (Bruce et al., 2010; Moolenaar et al., 2011). Certainly the context of each particular school factors into the success, or lack of, in any professional community. The influence of the principal, however, is paramount (Bryk et al., 1999; Friedkin & Slater, 1994; Hord, 1997; Hord & Sommers, 2008; Leithwood et al., 2004; Louis & Marks, 1998; Morrisey, 2000; Rosenholtz, 1989a, 1989b; Wahlstrom & Louis, 2008; Wiley, 2001).

Because of the various contexts within which a PLC must exist, measurement of its effects on student learning has been difficult to assess on a large scale (Bolam et al., 2005; Louis & Marks, 1998; Vescio et al., 2008). The next chapter will describe the methodology of this meta-analysis of dissertation research which attempted to characterize the quantitative relationship between professional learning communities and student achievement.

CHAPTER III:

RESEARCH DESIGN AND METHODOLOGY

Introduction

The term “professional learning community” has generated much interest in the educational community over the last sixteen years. As a result of this interest, research has been conducted on the characteristics of PLCs, how they are developed, how they are sustained, as well as the connections between PLC implementation and certain organizational outcomes, such as teacher commitment, teacher satisfaction, and in some cases, student achievement. The latter connection, however, has been sparse and to date, has yielded inconsistent outcomes. When studies do quantitatively link teacher community to student learning, they generally consist of small sample sizes or of isolated cases in a few schools or a single district. Bolam and colleagues (2005) and Louis and Marks (1998) have conducted some of the larger-scale studies to date.

Vescio and others (2008) conducted an in-depth review of the literature about the link between PLC implementation and student achievement. Their review analyzed eleven studies, where they found evidence of changes in culture and changes in teaching practice, believed to be a result of professional community. According to Vescio and colleagues, eight of the eleven original studies provided tentative empirical links between participation in professional learning communities and student learning. Although these studies focused on PLCs with primarily qualitative assessments, they examined student learning through use of authentic achievement or reading programs, and they all saw student performance on assessments increase.

Problem and Purposes Overview

The quality and quantity of professional development for teachers has been linked to changes in teaching practice and increased student learning. As a result, there is a need for the research community to establish a consensus about the effects of professional community on student learning. Federal and state professional development funds are spent each year on teacher learning which has yielded minimal gain. As good stewards of these funds, educators must make informed decisions about "quality" professional development opportunities for teachers and must spend these funds appropriately.

Since there are so few published studies that have established an empirical link to student achievement, this study focused on unpublished work, or dissertation research, conducted during the last sixteen years. By conducting a meta-analytic review of these dissertations, I hoped to provide a more reliable empirical grounding from which to base the use of professional learning communities as a viable mode of teacher learning.

Research Questions

As a result of this meta-analysis, I answered the following research questions. Based on available dissertation research from the last sixteen years,

1. What is the relationship between the implementation of professional learning communities and student achievement in reading in preK-12 schools;
2. What is the relationship between the implementation of professional learning communities and student achievement in math in preK-12 schools; and
3. What is the relationship between collective efficacy and professional learning communities in preK-12 schools, and the effects on student achievement?

Research Hypotheses

Null hypotheses are formulated to test the significance of the effect size of the meta-analysis. In this study, three null hypotheses were evaluated:

H_{01}: There is no significant relationship ($p \geq .05$) between the implementation of professional learning communities and student achievement in reading in preK-12 schools.

H_{02}: There is no significant relationship ($p \geq .05$) between the implementation of professional learning communities and student achievement in math in preK-12 schools.

H_{03}: Neither collective efficacy nor teacher efficacy are mediating variables ($p \geq .05$) between professional learning communities and student achievement in preK-12 schools.

The research hypotheses for this study were:

H_1: There is a significant ($p < .05$), positive relationship between teachers' participation in professional learning communities and student achievement in reading in preK-12 schools.

H_2: There is a significant ($p < .05$), positive relationship between teachers' participation in professional learning communities and student achievement in math in preK-12 schools.

H_3: Collective and teacher efficacy are mediating variables ($p < .05$) between professional learning communities and student achievement in preK-12 schools.

In other words, professional learning communities present an effective structure for providing professional learning for teachers in ways that benefit teachers and students.

Heterogeneity

Different criteria have been used to assess the effects of professional learning community participation on student achievement. As a result, the data set was presumed to be heterogeneous. To combat the effects of heterogeneity, the studies were categorized according to variables examined. The categories included dissertations linking: 1) components of professional learning

communities to student learning in reading and math, and 2) PLC implementation overall to student achievement data in reading and math. As a third category, dissertations linking collective or teacher efficacy as a mediating variable between PLC implementation and student learning were examined.

Effect Size

The subject matter and research base should be considered when evaluating effect sizes (Levine, Weber, Park, & Hullett, 2008). What may be considered a large effect in one literature base may be deemed insignificant in another (Levine et al., 2008). Although Cohen (1988) suggested guidelines for effect size, effect sizes in education could differ slightly (Hattie, 2009). According to Hattie, $d = 0.2$ would be considered a small effect, $d = 0.4$ would be moderate, and $d = 0.6$ would be considered a large effect size "when judging educational outcomes" (p. 9). An effect size of 0.4 should be the "hinge point" for assessing the value of an educational innovation (Hattie, 2009). Although not viewed as a "magic number" for which to aspire, Hattie argued that this moderate effect size would be one in which real-world change could be visualized in students. Moreover, an effect size below 0.4, though small, could be instrumental based on cost or contextual factors. Certainly any effect size above 0.4 would be in the "zone of desired effects" and would have the greatest impact on student learning (Hattie, 2009). In evaluating the results of this meta-analysis, Hattie's guidelines were followed.

Effect sizes were recorded, or calculated, from the data provided in each dissertation. Confidence intervals were also calculated. These statistics were used to test the null hypotheses to assess whether or not the outcomes were related to the independent variables. When the results of a regression were reported, these statistics were chosen over Pearson correlations. If only significant results of the regression were reported, then correlation coefficients were used. Some

studies included multiple statistics for one component using the same sample. These values were averaged to obtain one effect size for the variable for the study. S-PLUS was used to convert some effect sizes for input into Comprehensive Meta-Analysis, Version 2.

General Research Design

Much research has been conducted in the educational arena concerning what works best in achieving increases in student learning (Hattie, 2009). The resulting evidence can, at times, be overwhelming. As a result of the issue of integrating massive amounts of information, Glass (1976) coined the term "meta-analysis", which refers to the "analysis of analyses" (Glass, 1976, p. 3). According to Glass, meta-analysis gives researchers the ability to synthesize the results from several studies and integrate the findings into a cohesive, understandable outcome.

The concept of meta-analysis is defined as the process of converting the effects of several comparable studies into common units, or effect sizes (Hattie, 2009), so that these results can be averaged and an overall determination can be made concerning the cumulative findings of several studies (Levine et al., 2008). Levine and colleagues argued that the benefits of conducting a meta-analysis lie in a larger sample size than could be found in one study and the "greater statistical power and more precise confidence intervals" (p. 202).

There are, however, limitations to meta-analyses. The first limitation is that of "apples and oranges" (Glass, 2000). Critics of meta-analysis argued that if things are not the same, they cannot be compared; and trying to do so, causes difficulties (Hattie, 2009). Glass (2000) contended that if things are the same, then "there is no need to compare them" (p. 4).

A second criticism referred to as the "flat earth society" by Cronbach (1982), concerns the concept of an average (Glass, 2000; Hattie, 2009). Averages often conceal the contextual differences between studies and settings, choosing the "big facts" over the moderators (Glass,

2000; Hattie, 2009). In this study, the purpose of the meta-analysis was to conduct a quantitative review of available dissertation research which focused on PLCs and student achievement which may or may not result from their implementation. Since the purpose is to empirically examine whether or not learning communities may be effective means of professional learning for teachers, extensive contextual narratives are unnecessary. This meta-analysis, however, explored the relationships between the specific components of PLCs and student learning as well as the relationship of mediating variables, collective efficacy and teacher efficacy, to learning communities and student achievement. The exploration of these mediating variables provided some richness to the overall findings.

Publication bias, or the "file-drawer problem" is another criticism of meta-analysis (Slavin, 1995). When studies fail to produce findings that coincide with expected results, many times those studies do not get published. Over-reliance on studies from publications can result in bias favoring a significant, positive outcome (Slavin, 1995). As a result, Slavin encouraged the use of dissertations and unpublished reports as sources of studies for meta-analysis. He contended that dissertation committees often hold higher standards for student theses than do low quality journals.

This meta-analysis consisted of unpublished dissertations and doctoral theses, which minimized publication bias and decreased the difference in quality of sources (Sun, 2010). There are few published studies that investigate the quantitative connection between PLCs and student achievement and only one extensive review of the literature (Vescio et al., 2008). To my knowledge, only two meta-analyses have been conducted on this topic (Arredondo Rucinski, 2012; Lomos, Hofman, & Bosker, 2011). The Lomos, Hofman, and Bosker analysis was based

on five articles, while Arredondo Rucinski analyzed 13 published articles. With the focus on the variables described, this meta-analysis added a new dimension to the literature base.

Data Collection

An exhaustive search for dissertations and doctoral theses that focused on learning community implementation and student achievement was conducted to find all such non-published reports. Dissertation databases such as ProQuest, PsychINFO, Sociological Abstracts, World Cat, and ERIC were searched, including the terms "professional learning communities" and "student achievement." This study included unpublished dissertation research that reported quantitative, or quantitative and qualitative data. Other criteria that determined inclusion in this research:

1. the studies were available on dissertation data-bases;
2. the studies originated from institutions with the classification of Carnegie Doctoral/ Research Universities-Extensive between 1997 and 2012;
3. the studies involved student achievement data from preK-12 schools;
4. the studies included some type of assessment of PLC characteristics and some form of student academic achievement data which were quantitatively linked; and
5. the studies reported the quantitative data necessary to calculate effect size, i.e., *r*, R^2, regression, ANOVA, or t-test data.

Small sample size may skew the results of studies (Slavin, 1995). There were studies in this meta-analysis that were limited to a few schools. Since meta-analyses are based on weighted effect size averages, this weight compensated for the small sample size.

Searches of ProQuest yielded 3,985 dissertation previews that corresponded to the search terms "professional learning communities" and "student achievement." When searching

PsychINFO using the same criteria, 190 dissertations emerged. Sociological Abstracts produced 16 studies, World Cat yielded 144, and ERIC produced 32 dissertations conforming to the search criteria. Many of these dissertation records, however, overlapped among the databases.

During the initial screening process, I eliminated the dissertations that did not originate from Carnegie Doctoral institutions. I then read the abstracts of hundreds of dissertations to determine which studies met the selection criteria. I coded these abstracts as to whether the work included quantitative links between PLCs and student achievement. If the dissertation or thesis was primarily qualitative, it was eliminated. This screening process led to a preliminary list of 181 dissertations that might be included in this study. The next screening process included reading the methodology and results chapters of the dissertations. This process led to a secondary list of 44 dissertations that could be included in the meta-analysis.

Final Data Set

The remaining 44 dissertations were subjected to a final round of scrutiny to make sure these studies met the search criteria. This process eliminated 23 studies, resulting in a final set of 21. The model upon which this meta-analysis is based relies heavily upon the Hord components of PLCs. As such, PLC components in this study were assessed using either the *School Professional Staff as a Learning Community Questionaire (SPSLCQ),* the *Professional Learning Community Assessment-Revised (PLCA-R),* or another survey which assessed the PLC components in a similar way. One study used items from the *Advanced Questionaire* (Preis, 2009) which are also associated with teacher efficacy, and one used survey results from the *Education Longitudinal Study (ELS)* of 2002 and 2004 (Clark, 2008). The items included from these surveys assessed PLC components using questions and ideology which differs from the Hord model, so the studies were omitted from this meta-analysis.

Six dissertations stated that PLCs were being implemented but there was no assessment of the strength of the PLCs (Arteaga, 2008; Griffin, 2010; Hellman, 2007; Nalls, 2011; Pradere, 2007; Zeman, 2008). Other studies involved surveys; however, the surveys were not quantitatively linked to student achievement in the study (Cole, 2008; Foster, 2010; Lennon, 2010; O'Connell, 2009; Roher, 2009; Wendell, 2010). Two studies linked survey results to AYP: (1) whether or not the schools made AYP (Tiegen, 2009), and (2) whether or not the schools made AYP with conditions (Smith, 2009). These studies did not directly involve student achievement. Another study assessed PLC components and their link to school status, such as Academic Watch or Academic Excellence (Carlson, 2012). One study quantitatively combined PLCs, RtI, and an instructional process and linked to student achievement (Zyburt, 2010), but did not separate the effects of each. Another linked principal leadership behaviors to student achievement (McHenry, 2009), and one correlated instructional consistency to student achievement (Lee, 2010). Using certain items of a survey, one researcher did not specify which items were the PLC items used (Le Clear, 2005). Still another dissertation examined trust and student achievement; however, the researcher examined the facets of trust instead of trust in principal, colleagues, or clients (Davies, 2011). Finally, in one dissertation, it was not clear whether or not teachers were administered more than one survey, so this study was excluded (Berebitsky, 2010). With the elimination of these studies, this meta-analysis was limited to 21 studies. The final list is presented in Table 2.

Table 2

Dissertations Resulting from Screening (N = 21)

Author	Institution	Year
Applegate, Perri	University of Oklahoma	2012
Burdett, John	University of North Texas	2009
Bynes, Damita	Georgia Southern University	2011
Campoli, Ashley	University of Southern Mississippi	2011
Cassity, Amanda	University of Alabama	2012
Cieslak, Michael	The George Washington University	2011
Davis, Monique	The George Washington University	2009
Ervin, Sandra	University of Southern Mississippi	2011
Gallozzi, Joletta	University of Denver	2011
Isoye, Steven	Northern Illinois University	2011
Kriznar, Dana	University of Florida	2011
Matthews, Kristin	University of Missouri, Columbia	2009
Orchard, Patricia	University of Missouri, Columbia	2007
Roberts, Mindy	University of Nebraska, Lincoln	2010
Swindler, Nichel	University of Southern Mississippi	2009
Terrell, Hope	The George Washington University	2010
Turner, Scot	Virginia Polytechnic Institute and State University	2008
Varano, Samuel	Lehigh University	2010
Vencel Mobley, Andrea	Indiana University	2009
Wheaton, Julia	Loyola University of Chicago	2008
Zito, Mark	University of Massachusetts-Amherst	2011

When compiling the final list of dissertations included in this analysis, I found that none were written before 2007. As I looked back at the initial screening parameters in ProQuest, I found that the search started at 1998, instead of 1997, which I input as the beginning date. There was, however, only one dissertation, which came up in the search for "professional learning communities" and "student achievement" in 1998, and only one in 1999. In 2004, 79 dissertations referenced PLCs and student achievement, and in 2005, 309 included the search terms. The number of dissertations including the search terms increased each year forward, with 1,063 studies including the search terms in 2012. Although these studies included the search terms, they did not meet the other guidelines for inclusion in this analysis.

Validity and Reliability

Meta-Analysis

Reliability in meta-analysis is defined as the "reproducibility" of similar results when the same body of literature is analyzed by different researchers (Zakzanis, 1998). Using a systematic, exhaustive search of dissertation databases based on explicit search criteria that included all relevant studies while excluding those outside the realm of this meta-analysis, established reliability in this study (Ahn, Ames, & Myers, 2012; Sun, 2010). Reliability was maintained by sample, interrater coding by the dissertation chair (Wolf, 1986). Since this meta-analysis was a dissertation, this study was under the scrutiny of a Carnegie Doctoral/Research University dissertation committee, which may have ensured a higher quality study (Slavin, 1995).

Two types of validity are applicable to research studies: external and construct validity. Since this dissertation tested different components and moderating variables as well as homogeneity, external validity was asserted (Wolf, 1986). Internal, or construct validity, was enhanced by the selection of non-published dissertations and theses that originated from research-oriented universities (Wolf, 1986). This selection was believed to assure a high level of quality for all included studies. The reliability and validity statistics from the predictor and outcome variables are outlined in this section, which corroborated the meta-analytic validity (Ahn et al., 2012).

PLC Survey Instruments

The independent variable, implementation of PLCs, was operationalized by the various survey instruments used in the studies. Of the twenty-one studies included in this analysis, four researchers (Applegate, 2008; Cassity, 2012; Cieslak, 2011; Gallozzi, 2011) used the *School Professional Staff as Learning Community Questionnaire (SPSLCQ).* One used the revised form

(Bynes, 2011) of the *Professional Learning Community Assessment (PLCA).* All others used a different assessment of learning community characteristics. These instruments are included in Table 3.

Table 3

Assessments of PLC Components

Author	PLC Assessment
Applegate (2008)	*School Professional Staff as a Learning Community Questionaire (SPSLCQ)*
Burdett (2009)	*Early Childhood Longitudinal Study (ECLS)*
Bynes (2011)	*Professional Learning Community Assessment – Revised (PLCA-R)*
Campoli (2011)	*School Improvement Survey*
Cassity (2012)	*School Professional Staff as a Learning Community Questionaire (SPSLCQ)*
Cieslak (2011)	*School Professional Staff as a Learning Community Questionaire (SPSLCQ)*
Davis (2009)	*Distributed Leadership Survey*
Ervin (2011)	*Collaboration Survey*
Gallozzi (2011)	*School Professional Staff as a Learning Community Questionaire (SPSLCQ)*
Isoye (2011)	*Leadership Capacity School Survey*
Kriznar (2011)	*Middle Level Educator Survey*
Matthews (2009)	*Middle-Level Teacher Assessment Practices Survey*
Orchard (2007)	*Learning Centered Professional Development School Practices Survey*
Roberts (2010)	*Improving Student Achievement through Professional Learning Communities Survey*
Swindler (2009)	*School Culture Survey*
Terrell (2010)	*Distributed Leadership Readiness Scale (DLRS-1)**
Turner (2008)	*Powell Survey*
Varano (2010)	*Dimensions of the Learning Organization Questionaire (DLOQ)*
Vencel Mobley (2009)	*Leadership Practices Survey*
Wheaton (2008)	*Impact of School Climate and Structure on Continuous School Improvement*
Zito (2011)	*Teacher Collaboration Survey*

* An error in the submission of the survey to the Institutional Review Board resulted in the omission of one question. The DLRS became DLRS-1.

The *School Professional Staff as Learning Community Questionaire (SPSLCQ),* developed by Hord, Meehan, Orletsky, and Sattes (1999) was piloted in 1996 during a summer program (n = 28). The instrument was tested for three types of validity: content, concurrent, and construct validity (Hord et al., 1999). According to the authors, content validity was established by an extensive review of the literature as well as fieldwork conducted with PLCs that were known to be functioning as learning communities. Secondly, concurrent validity, or the comparison of the instrument to another instrument which measures the same construct, was conducted by the researchers. A school climate survey was correlated to the SPSLCQ and maintained a "satisfactory" correlation ($r = .7489$, $p = .001$).

Construct validity measures the ability of the instrument to assess the "construct" in question (Hord et al., 1999). In this case, the construct was professional learning communities. The scores from the teachers in the field test sample of schools (n = 690) were found to be significantly different ($p = .0001$) from those of the teachers in the school which was known to be functioning as a PLC, thereby, establishing construct validity.

The SPSLCQ was tested for both internal consistency (Cronbach's alpha) and stability (test-retest). According to the authors, the pilot test yielded a Cronbach alpha score of .92. Any score above .75 is considered to be appropriate for internal consistency (Hord et al., 1999). The test-retest reliability score for participants whose IDs could be matched was .94 (Hord et al., 1999).

The pilot test yielded sufficient reliability coefficients; however, the authors decided to field test the assessment with a larger number of schools. Twenty-one schools and 690 teachers over four states, including Kentucky, Tennessee, Virginia, and West Virginia, participated in this field test (Hord et al., 1999). One of the school staffs who participated in the study was known to

be operating as a PLC. When computing the internal reliability statistic, again the rating was .94 (Hord et al., 1999). Because of problems matching participant identification numbers, the study resulted in a small sample size in computing the test-retest coefficient. This coefficient was determined to be .6147, which was considered "marginally satisfactory" (Hord et al., 1999, p. 7).

Burdett (2009) used data from the *Early Childhood Longitudinal Study: Kindergarten Class of 1998-99* (ECLS-K) to ascertain the relationship between PLC implementation and student learning over time. The ECLS-K used item response theory (IRT) to assess the achievement of students from kindergarten to fifth grade (Burdett, 2009). As part of the ECLS-K study, teachers, principals, and district staff completed a questionnaire to assess the social and educational aspects of the schooling environment.

Basing his study on Hord's theory, Burdett examined the survey information in light of the five PLC components described by Hord. Burdett used principal component analysis to derive two variables, support and collaboration, from the fourteen items on the school staff questionnaire. These overarching components explained eight of the original survey items, thus reducing the items included in the study from fourteen to eight (Burdett, 2009).

Bynes (2011) used the *Professional Learning Communities Assessment – Revised (PLCA)* (Olivier, Hipp, & Huffman, 2008) to assess the characteristics of PLCs in high-performing and low-performing middle schools. This survey assesses the same components as the Hord instrument. In testing internal consistency, the survey developers reported subscales for the six components (n = 1209): Shared and Supportive Leadership (.94), Shared Values and Vision (.92), Collective Learning and Application (.91), Shared Personal Practice (.87), Supportive Conditions-Relationships (.82), Supportive Conditions-Structures (.88), and a one-factor solution (.97) (Olivier, Antoine, Cormier, Lewis, Minckler & Stadalis, 2009).

Bynes (2011) calculated her own reliability statistics for the study. Reliability coefficients were computed for the survey composite (.98), shared and supportive leadership (.94), shared values and vision (.93), collective learning and application (.93), supportive conditions – relationships (.88) and structural (.93), and shared personal practice (.90). These statistics indicated strong internal consistency for her study.

Campoli (2011) utilized the *School Improvement Survey* to assess the state of job-embedded professional learning (JEPL) and distributed leadership in a large urban district in Georgia. Using factor analysis, the researcher found the Cronbach alpha coefficients of the items selected by the expert panel to be strongly indicative of internal consistency (.954). The survey was administered by the district and assessed different components of school culture.

Campoli assembled an expert panel to choose items from the survey that would best correlate to the constructs of job-embedded professional learning and distributed leadership. The members of this panel were asked to read the items in the professional learning and leadership sections of the survey and select items which best represented the two constructs. This selection process resulted in four items chosen for JEPL and three items selected to assess distributed leadership (Campoli, 2011).

Using items from the original DLRS, the *Teacher Leadership School Survey* (Katzenmeyer & Katzenmeyer, 1998), and the *School Leader Questionnaire* (University of Michigan, 2001), Davis (2009) developed the *Distributed Leadership Survey*. This instrument was developed to assess the overall construct of distributed leadership as well as the seven components of the construct which Davis extracted from the professional literature. Two pilot tests were conducted on this assessment (Davis, 2009). Reliability was assessed on the second study. After running tests for internal consistency, 12 items were removed, leaving 37 questions

which measured the seven components of distributed leadership. The Cronbach alpha coefficients for the seven components ranged from .60 to .86. The three coefficients for the components used in this meta-analysis (School Organization, School Vision, and Teacher Leadership) were .83, .79, and .75, which were all above the suggested .60, according to Davis (2009). When Davis checked the internal consistency of her own study, she found the three component coefficients used in this meta-analysis to be .79, .89, and .87, respectively.

To establish content validity in Davis' (2009) study of distributed leadership and its correlation to student achievement, she identified components and survey items from empirical studies in the literature. Davis also consulted three other surveys of distributed leadership, the DLRS, the *Teacher Leadership School Survey,* and the *School Leader Questionnaire.* Davis used items from each of these assessments as well as items she developed to create the *Distributed Leadership Survey.* She then piloted the instrument with students in the local doctoral program who gave her feedback on the clarity of the assessment and any revisions which should be made (Davis, 2009). Another pilot study was conducted with teachers at one elementary school with similar characteristics to those who would participate in the real study.

Ervin (2011) used McHenry's *Collaboration Survey* to assess teacher collaboration in her study of select elementary and middle schools in Cobb County, Georgia. She used two sections of the survey for a total of 28 questions, based on a Likert-type scale. The survey design provided for qualitative responses on some questions. To assess reliability, McHenry (2009) piloted the instrument in two schools with 46 teachers participating in the pilot. Cronbach alpha coefficients were computed to assess internal consistency (Leadership = .909; Collaboration, Part I = .930; Collaboration, Part II = .813) (McHenry, 2009). For the purpose of the Ervin study which utilized only 28 of the 52 items, she found the Cronbach alpha coefficient to be high (r =

.89). Item correlations were then assessed, resulting in 14 questions which were used to compute level of teacher collaboration, level of administrative support, and length of time collaborating (Ervin, 2011).

Isoye (2011) used the *Leadership Capacity School Survey* to assess leadership components in his study. To test internal consistency, he conducted Cronbach analyses and obtained the following statistics: 1) broad-based, skillful participation in the work of leadership (.85); 2) shared vision that results in program coherence (.82); 3) inquiry-based use of information to inform decisions and practice (.84); 4) roles and actions that reflect broad involvement, collaboration, and collective responsibility (.81); and 5) reflective practice that consistently leads to innovation (.83). These Cronbach coefficients indicated appropriate internal consistency for Isoye's study.

To study the effects of interdisciplinary teaming and common planning, Kriznar (2011) adapted a survey developed by the National Association of Secondary School Principals (NASSP), the *Middle Level Educator Survey.* This survey, in its original form, was used in two national studies of effective leadership, one by Valentine, Clark, Hackmann, and Petzko (2000) involving more than 14,000 middle school principals (Kriznar, 2011). Kriznar, however, used only the items which assessed the exemplary middle school practices (Kriznar, 2011). No other validity or reliability information was reported.

Matthews (2007) used the *Middle-Level Teacher Assessment Practices Survey (TAPS-ML)* to collect data for her study. This instrument was developed by the researcher and the director of the Middle Level Leadership Center (Matthews, 2007). According to Matthews, the instrument was created from a review of the literature. The instrument was piloted and factor analysis was conducted (Matthews, 2007). For an item to be included in a factor, "the items had

to load at .40 or higher, and if the items cross-loaded, the difference between the loadings had to be .15 or higher to be included in the factor" (Matthews, 2007, p. 91).

Orchard (2007) used the *Learner-Centered Professional Development (LCPD) School Practices Survey* (Lauer, 2000) to assess job-embedded professional learning in Missouri elementary schools. She piloted the instrument with a focus group of twenty teachers, which helped assess the understandability of the questions and approximate administration time. Test-retest coefficients were calculated for the subscales and the complete LCPD survey. Since the LCPD complete instrument is the only part included in this meta-analysis, this is the only statistic included ($r = .900$, $p < .001$).

The LCPD was developed from an earlier survey, McRel's *School Practices Survey* (Orchard, 2007). The items on the new instrument were adapted from the former, including new questions which came from research on school reform and learner-centered practices, according to Orchard. This information was cross-referenced with research from Dufour and colleagues on professional learning communities (Orchard, 2007). Therefore, Orchard maintained that content validity was established.

The Roberts (2010) instrument, the *Improving Student Achievement through Professional Learning Communities Survey*, focused on three themes: assuring students learn at high levels, creating a culture of collaboration, and focusing on academic results. In linking PLC implementation to student learning, only one section of the survey was used, focusing on academic results. To test for internal consistency, the author computed Cronbach alpha statistics for each theme. Six items on the instrument assessed the first theme (learn at high levels) and resulted in a Cronbach alpha coefficient of .86. The second theme, culture of collaboration,

yielded a coefficient of .86, while the theme of focusing on academic results produced a Cronbach's alpha statistic of .84.

To assess validity, Roberts (2010) piloted the researcher-developed survey with 48 teachers from her school that did not participate in the study. In an effort to eliminate bias in the questions and to ensure validity, Roberts requested narrative feedback concerning changes needed to improve the assessment. When the responses were returned, she analyzed the feedback and made the suggested revisions (Roberts, 2010).

Swindler (2009) utilized the *School Culture Survey* (Valentine, 2006) to assess school culture characteristics and student learning. To assess internal consistency, Cronbach alpha values for each component were calculated: Collaborative Leadership (.910), Teacher Collaboration (.834), Unity of Purpose (.821), and Collegial Support (.796). The other two components, Professional Development and Learning Partnerships, were excluded from this meta-analysis. This instrument had been tested previously in several dissertations and research studies (Swindler, 2009).

Terrell (2010) utilized the *Distributed Leadership Readiness Scale (DLRS)* to assess the impact of distributed leadership components on student achievement in math and reading in elementary schools. Exploratory factor analysis was conducted which resulted in Cronbach alpha coefficients which ranged from .84 to .92, which indicated internal consistency.

An error in the submission of the survey for approval from the Institutional Review Board resulted in the omission of one question from the survey, a question from the Shared Responsibility component (Terrell, 2010). This omission resulted in the instrument being renamed as the DLRS-1 and new internal consistency coefficients being calculated. The revised

Cronbach alpha coefficients were .78 to .84, thus indicating moderately strong reliability (Terrell, 2010).

The original instrument, developed by the Connecticut State Department of Education, was based on effective schools research and Elmore's (2000) work in distributed leadership (Terrell, 2010). According to the author, instrument analysis by a committee of educators was conducted to establish face validity; factor analysis was used to assign items to distributed leadership components. Furthermore, two pilot studies were conducted to establish the validity of the survey. The first study, consisting of four schools and 150 respondents, established a connection between distributed leadership components and student achievement. After the second study, validity was established based on responses by more than 1,200 respondents from 36 Connecticut schools (Terrell, 2010).

Turner (2008) utilized a survey from a colleague at the Virginia Polytechnic Institute and State University to assess leadership characteristics which affect PLC components. He used a validation process to shorten the original Powell (2004) survey, designed for a study of elementary schools, to make it appropriate for high schools. The researcher reported the original Cronbach alpha score from Powell's calculations (0.9582).

Turner piloted his survey with 15 members of a doctoral cohort, following the same process as Powell:

1. If 80% of the respondents replied with Strongly Agree or Agree that the question was a good one, this was deemed to be an appropriate question;
2. If responses included multiple domains, then a question with 60% agreement was used;

3. If 33% of respondents indicated that the question was somewhat unclear, then Powell used her own judgment as to whether or not to revise the question.

Since Turner's survey was developed for secondary schools, he asked the respondents to indicate if the question was appropriate for high schools. The Turner survey was shortened from Powell's original 76 questions to 65 for his high schools study.

In Varano's (2010) study of learning organizations in Pennsylvania high schools, he used the *Dimensions of the Learning Organization Questionnaire (DLOQ)* (Watkins & Marsick, 1999). Yang, Watkins, and Marsick (2004) computed Cronbach alpha coefficients for each dimension and found them all to be above 0.80. The instrument developers used 836 participants from the business sector to assess the construct validity of the DLOQ. Using confirmatory factor analysis, Yang and colleagues found that many inter-dimension correlations tended to be more than .70, which indicated that "a more parsimonious assessment for the construct of learning organization is warranted" (p. 43).

Vencel-Mobley (2009) and a co-author developed the *Survey of Leadership Practices* in 2004, which assessed principals' contributions to building learning communities at their respective schools. The co-author, Flowers, administered the instrument to all Indiana high school and middle school principals in the 2004-2005 school year; however, the results of this study were not available, according to Vencel-Mobley. Vencel-Mobley revised the survey for the present study.

The Wheaton (2008) survey, the *Impact of School Climate and Structure on Continuous School Improvement,* was administered to one junior high principal and one high school principal to assess the understandability of questions. During her study, Wheaton obtained information

from the school improvement plans to corroborate the answers from the survey. No other validity or reliability information was reported.

In his study, Zito (2011) used the *Teacher Collaboration Survey*, developed by the school district under study, a professor from a Research I university who researched PLCs extensively, a professor who specialized in testing, and the Connecticut Center for School Change. In assessing internal consistency reliability, Cronbach alpha coefficients were computed. The coefficient for the collaboration portion of the survey was calculated to be .930, which was considered to be appropriately reliable (Zito, 2011). Content, construct, and face validity were asserted in that the instrument was developed by the professor from a Research I university, who was deemed to be a "Subject Matter Expert" (p. 119). No other statistics were reported.

Collective Efficacy Instrument

Two studies attempted to link collective efficacy, professional community, and student achievement. Gallozzi (2011) used the *Collective Efficacy Scale* to operationalize the collective efficacy of teachers. This form was a shortened version of the original instrument developed by Goddard in 2000 (Gallozzi, 2011). Citing statistics from Goddard, Gallozzi maintained that the Cronbach alpha coefficient indicated high internal consistency ($\alpha = .94$). In the researcher's own study, she found the internal consistency to be comparable at .87 (Gallozzi, 2011). According to Goddard (2002), the correlation between the original form of the survey and the shortened form was $r = .983$ (Gallozzi, 2011).

Cassity (2012) used the *School Academic Optimism Scale (SAOS)* (Hoy, 2005) to examine the effects of academic optimism, and its components, on student achievement. A component of academic optimism, collective efficacy was assessed by twelve items on the instrument which are identical to the items on the *Collective Efficacy Scale* (Goddard, 2002).

Cassity found the Cronbach alpha coefficient for internal reliability for the collective efficacy component to be .92.

Student Achievement Data

In all but one study in this analysis, the dependent variable, student achievement, was operationalized using some form of state assessment results. These state assessments are required to meet the NCLB guidelines established in 2001. NCLB set forth certain criteria for the development of state assessments. In reference to this analysis, the law required that a state assessment be statistically valid and reliable (NCLB, 2002). In creating flexibility, however, NCLB allowed the states to create an assessment based on content standards or to choose another criterion-referenced assessment, norm-referenced assessment, or combination thereof, which assessed the standards (NCLB, 2002). Twenty dissertations in this analysis used either a criterion- or norm-referenced assessment to assess student learning.

Burdett (2009) used ECLS-K IRT data to examine student learning. According to Embretson and Reise (2000), item difficulty, item discrimination, and guessing are taken into account in the IRT model (Burdett, 2009). As a result, reliability of the results was assumed. Roberts (2010) used teacher-created, criterion-referenced assessments to link PLCs and achievement. These assessments, though teacher-developed, were reported to the state for accountability purposes because they were based on equivalent or more rigorous standards than the state assessments (Roberts, 2010).

Summary

Chapter III provided an overview of the methodology used in this meta-analysis. A review of the research problem, purpose of the study, and research questions was provided which led to the development of the null and research hypotheses to be evaluated. A brief explanation

of meta-analysis was provided as well as the limitations of this form of research. Methods to circumvent the limitations were described. The section on data collection detailed the methods used in the search for dissertations which met the search criteria. These criteria were explained in detail, along with the procedures for coding the information obtained from the studies. The final data set was described as well as reliability and validity information for the variables. The next chapter details the findings from this meta-analysis.

CHAPTER IV:

RESULTS

Introduction

This study examined unpublished, dissertation research conducted between 1997 and 2012 that attempted to link the work teachers do in professional learning communities to the academic achievement of their students. A comprehensive review of dissertation databases revealed 21 studies that met the selection criteria described in the last chapter. This chapter presents the findings from the meta-analyses of these studies.

Composite PLC Scores

To enhance statistical validity, different meta-analyses were used to assess the utility of professional learning communities. Of the 21 included studies, four reported a correlation between the composite PLC score and some measure of student achievement in reading (Cassity, 2012; Gallozzi, 2011; Orchard, 2007; Zito, 2011). Two studies reported correlations between a composite PLC score and student achievement in math (Gallozzi, 2011; Zito, 2011). Cassity (2012) and Gallozzi (2011) incorporated the *School Professional Staff as Learning Community Questionaire (SPSLCQ)* in their assessment of PLC characteristics, which was described in detail in Chapter III. The remaining three researchers used other instruments.

Orchard (2007) utilized the *Learner-Centered Professional Development (LCPD) School Practices Survey* (Lauer, 2000) to assess professional learning practices which correlated to student achievement on the *Missouri Assessment Program (MAP)* for third grade in

communication arts. Upon analysis of this instrument, this researcher found similarities between items on the LCPD survey and Hord components:

1. *Shared and Supportive Leadership:* "Teachers at my school are actively involved in selecting what they are going to learn and how to use the new information" and "Teachers at my school are encouraged to work together to solve problems rather than being told what to do from an authority figure;"
2. *Shared Values and Vision:* "My school expects teachers to analyze data in order to guide student progress toward clear and shared academic goals" and "Teachers in my school work from the belief that learning is a never-ending process of change in order to reach all students;"
3. *Collective Learning:* "The professional development at my school is organized around collaborative problem solving that reduces teacher isolation" and "Professional development at my school is embedded in the day-to-day practices of teachers through collaborative activities aimed at improving instruction;"
4. *Shared Personal Practice:* "My school provides adequate follow-up and support for new instructional practices" and "Teachers at my school work collaboratively in teams to implement new practices that help all students successfully meet high standards;"
5. *Supportive Conditions:* "Teachers in my school are provided with time and support to participate in collaborative problem solving with teachers in the same school, subject, or grade level" and "Teachers in my school are able to approach disagreements with high levels of trust and an assumption of good intentions on

the parts of all members because they have found common ground in their purposes and priorities."

Survey results were averaged by teacher and by school and were correlated to student achievement on the MAP. It seemed reasonable that this instrument adequately assessed the PLC construct based on the Hord domains.

Zito (2011) used the *Teacher Collaboration Survey* to assess the relationship between teacher participation in PLCs and student achievement on the *Connecticut Mastery Tests*. Upon comparing the instrument to assure compatibility with other instruments included in this meta-analysis, this researcher found that the Zito collaboration assessment represented each component of the Hord model in the following ways:

1. *Shared and Supportive Leadership:* "We regularly make decisions about what instructional practices to initiate, maintain, develop, or discontinue;" and "Decisions are transparent—everyone knows what the decision is and how and why it was made."
2. *Shared Vision:* "All the members of my primary PLC share and express a vision for student learning;"
3. *Collective Learning:* "Our dialogue is focused on the examination of instructional practice and student performance data;"
4. *Shared Personal Practice:* "We observe the classroom instruction of our colleagues;" and
5. *Supportive Conditions:* "Our meetings are consistently attended by ALL members" and "The accomplishments of our primary PLC are publicly recognized."

On examination of the administrative support questions, I decided to omit those results from this study. These questions were found to be too different from those from other surveys used in this analysis. The questions in this section on the *Teacher Collaboration Survey* were more concerned with administrative evaluation of the PLC process than with the construct of shared and supportive leadership, which is the focus of this study.

Composite PLC Scores and Reading

Cassity (2012) examined components of learning communities in relation to results from the *Alabama High School Graduation Exam (AHSGE)* in eleventh grade and the *Alabama Reading and Math Test (ARMT)* in seventh grade in her study of Alabama middle and high schools. She discovered a slight, but non-significant relationship between PLCs and student achievement in reading ($r = .016$, $p = .905$). This correlation translated into an overall effect size, which was positive, but minimal ($d = .032$), according to Hattie's (2009) guidelines.

Gallozzi (2011) attempted to link teacher perceptions of collective efficacy to their perceptions of the effectiveness of PLCs in their schools, and then attempted to correlate these constructs to student growth on the *Colorado Student Achievement Program (CSAP)* in reading, writing, and math. For this meta-analysis, only reading and math were analyzed. Utilizing the SPSLCQ to obtain a composite score for PLC characteristics, the researcher found no statistically significant correlations between PLC characteristics and growth in reading on the state assessment ($r = .095$, $p = .589$). The calculated effect size ($d = .191$) was positive, but small.

In twenty elementary schools, Orchard (2007) examined learner-centered professional development and student achievement on the *Missouri Assessment Program (MAP)* results in Communication Arts. Using Pearson correlation coefficients, Orchard found that there was a

strong connection between learning community characteristics and state assessment results in language arts (r = .729, p = .001). This significant coefficient translated into a large effect size (d = 2.130), based on Hattie's (2009) criteria.

Zito (2011) administered the *Teacher Collaboration Survey* to teachers in five elementary schools and one middle school and compared the results to student achievement as measured by the *Connecticut Mastery Tests*. When the composite PLC scores were aggregated to the team level, the results were not significant (t = .672, p = .504). This statistic was converted to a small to moderate size Cohen's d (d = 0.316).

Utilizing composite scores from PLC assessments, the synthesis of the four included studies indicated that PLC implementation had a moderate effect on student achievement in reading (d = 0.429). A random effects model was used to aggregate the studies to calculate an overall effect size for PLC implementation as a whole. A test of homogeneity revealed that the data set was homogeneous (p = .051). Cohen's ds, standard errors, and lower and upper limits for the calculations are included in Table 4.

Table 4

Effect Sizes for Composite PLC Scores and Reading Achievement

			95% Confidence Interval	
Author	Cohen's *d*	Standard Error	Lower Limit	Upper Limit
Cassity (2012)	0.032	0.267	-0.492	0.556
Gallozzi (2011)	0.191	0.290	-0.378	0.759
Orchard (2007)	2.130	0.709	0.741	3.519
Zito (2011)	0.316	0.491	-0.647	1.278
Random Model	0.429	0.316	-0.190	1.048

Results from this meta-analysis indicated that as teachers worked together collaboratively in teams in the schools in these four studies, student achievement on reading assessments

increased. PLC implementation and its effects on student learning in math are addressed in the next section.

Composite PLC Scores and Math

In her study of PLC components and math growth on the CSAP, Gallozzi (2011) found that student growth on math state assessments was positively correlated to teacher participation in PLCs, although the results were not significant (r = .168, p = .334). This Pearson correlation coefficient was converted to a common effect size, Cohen's d, which indicated a small to moderate effect of PLC components on student learning in math (d = .341). Using the results from the *Teacher Collaboration Survey*, Zito (2011) regressed team collaboration onto student achievement in math. There was a positive relationship (t = .556, p = .580), and the effect size was calculated to be d = .262.

The two studies were analyzed using a random effects model. Again using composite scores from the surveys in the two studies, a small to moderate effect was found for teacher participation in learning community activities and its effects on student achievement in math (d = .320). When homogeneity was tested, it was found that homogeneity was not violated (p = .890). The statistics in this meta-analysis are included in Table 5. These results indicated that as teacher participation in PLCs increased, math achievement increased in these particular studies.

Table 5

Effect Sizes for Composite PLC Scores and Math Achievement

Author	Cohen's *d*	Standard Error	95% Confidence Interval	
			Lower Limit	Upper Limit
Gallozzi (2011)	0.341	0.293	-0.233	0.915
Zito (2011)	0.262	0.489	-0.697	1.221
Random Model	0.320	0.251	-0.172	0.813

PLC Components

Table 6 presents the studies that assessed the different components of PLCs and their relationship to student achievement in reading and math. For example, Burdett (2009) examined four components of PLCs in both reading and math, with Shared Personal Practice being excluded from his analyses. Cassity (2012), however, examined all five components of PLCs in reading only. These components were analyzed separately to assess the degree of influence of each component on student learning in these subjects.

Table 6

Dissertations and PLC Components in Reading and Math

	Reading					Math				
Author	SSL[1]	SV[2]	CL[3]	SPP[4]	SC[5]	SSL[1]	SV[2]	CL[3]	SPP[4]	SC[5]
Burdett (2009)	X	X	X		X	X	X	X		X
Campoli (2011)						X		X		
Cassity (2012)	X	X	X	X	X					
Cieslak (2011)			X	X	X					X
Davis (2009)	X	X			X	X	X			X
Isoye (2011)	X	X	X			X	X	X		
Kriznar (2011)					X					X
Matthews (2009)			X					X		
Roberts (2010)			X					X		
Swindler (2009)	X	X	X		X	X	X	X		X
Terrell (2010)	X	X				X	X			
Varano (2010)	X	X	X		X	X	X	X		X
Wheaton (2008)		X	X		X		X	X		X

1 Shared and Supportive Leadership
2 Shared Vision
3 Collective Learning
4 Shared Personal Practice
5 Supportive Conditions

Campoli (2011) assessed the effects of job-embedded professional learning and distributed leadership using the *School Improvement Survey,* which was administered in a large urban school district in spring of 2010. The instrument consisted of several items that assessed different components of school climate (Campoli, 2011). For Campoli's study, a panel of experts

selected items that best represented job-embedded professional learning and distributed leadership. Four items were used to evaluate the professional learning construct, and three items assessed distributed leadership. In evaluating the survey for this study, the following sample questions appeared to illustrate a relationship to the Hord domains:

1. *Job-Embedded Professional Learning – Collective Learning:* "Teachers and administrators participate in job-embedded professional learning and collaboration addressing curriculum, assessment, instruction, and technology" and "Teams meet to review and study current research to make informed instructional decisions;" and
2. *Distributed Leadership – Shared and Supportive Leadership:* "Our principal and other school administrators collaborate with staff members and other stakeholders to elicit input and provide opportunities for shared decision-making and problem-solving" and "Staff members have opportunities to serve in a variety of leadership roles."

Davis (2009) developed her own survey, the *Distributed Leadership Survey (DLS)* to assess the presence of components of distributed leadership and to determine relationships between those components and student achievement. According to her, seven components were found in the literature: school organization, school vision, school culture, instructional program, artifacts, teacher leadership, and principal leadership. Based on comparison to the Hord components, three Davis components were used in this analysis:

1. *School Organization – Supportive Conditions:* "The school's daily and weekly schedules provide time for teachers to collaborate on instructional issues" and "There is a formal structure in place in the school to provide teachers and

professional staff opportunities to participate in school level instructional decision-making;"

2. *School Vision – Shared Vision:* "Teachers can clearly describe the school's vision" and "The school has a set of shared values that guide school improvement efforts;"
3. *Teacher Leadership – Shared and Supportive Leadership:* "Informal school leaders play an important role in the school in improving the performance of their colleagues" and "The school has expanded its capacity by providing professional staff formal opportunities to take on leadership roles."

Even though Davis (2009) correlated the composite score on her survey to student scores in reading and math, these correlations were not used in this analysis because the survey was considered to be too different from the Hord PLC model. Only the three distributed leadership components described above were included in this research.

Isoye (2011) examined components of PLCs using the *Leadership Capacity School Survey*, which was adapted from the original form developed by Lambert (2003). The following components were assessed by the instrument:

1. *Broad-based, skillful participation in the work of leadership – Shared and Supportive Leadership:* "In our school, we share authority and resources" and "In our school, we engage each other in opportunities to lead;"
2. *Shared vision that results in program coherence – Shared Vision:* "In our school, we develop our school vision jointly" and –"In our school, we keep our vision alive by reviewing it regularly;"

3. *Inquiry-based use of information to inform decisions and practice – Collective Learning:* "In our school, we use a learning cycle that involves reflection, dialogue, inquiry, and action" and "In our school, we use data evidence to inform our decisions and teaching practices;"
4. *Roles and actions that reflect broad involvement, collaboration, and collective responsibility – Collective Learning:* "In our school, we have developed new ways to work together" and "In our school, we have developed a plan for sharing responsibilities in the implementation of our decisions and agreements;"
5. *Reflective practice that consistently leads to innovation – Collective Learning:* "In our school, we make time for ongoing reflection (e.g., journaling, peer coaching, collaborative planning" and "In our school, we practice and support new ways of doing things"

The last leadership component in the survey, high or steadily improving student achievement and development, is the overall goal of the PLC process, so it was not included as a component in this analysis.

Kriznar (2011) studied the relationships between interdisciplinary teaming and common planning time, and student achievement gains of 6th graders as measured by the *Florida Comprehensive Assessment Test (FCAT).* In this study, teaming and common planning were the dependent variables. Teachers, counselors, and administrators in a large urban district were administered the *Middle Level Educator Survey*, which assessed the degree of implementation of these best practices. Of the constructs assessed by this instrument, the following were deemed to be consistent with the Hord component of supportive conditions: 1) interdisciplinary teams of 2

to 5 teachers sharing common students and housed in close proximity to each other; and 2) common teacher planning for teachers with the same set of students provided on a daily basis. Survey respondents indicated the presence of these characteristics with a Likert score of 1 to 5, with a score of 1 indicating that this characteristic was not present in the school, and a 5 indicating that every aspect of this characteristic was present in the school.

Matthews (2007) utilized the *Middle-Level Teacher Assessment Practices Survey* to examine the assessment practices of middle school teachers in Missouri. This instrument was more of an assessment of assessment practices; however, there were four questions relating to Collaboration through Assessment. These questions, based on Hord domains, included the following representative items (Collaboration through Assessment – Collective Learning): "I meet with my principal, colleagues, and/or team to analyze informal classroom assessment data (e.g. weekly assignments, daily quizzes, performance assessments) to plan for further instruction" and "I meet with my principal, colleagues, and/or team to analyze and discuss formal assessment data (e.g. writing assessments, SRI, DRA, math objective tests), to look for individual students that need extra help" (Matthews, 2007).

Roberts' (2010) mixed methods study used a researcher-developed instrument to assess the presence of PLC characteristics, and then correlated the level of these characteristics to student scores on teacher-developed, criterion-referenced assessments. As part of one research question in the study, Roberts used one section of the survey, Team's Skill Level for Academic Results, to determine the strength of the PLC. She then computed correlation coefficients to assess the relationship between teacher learning and student learning in reading and math. After examining the Roberts' survey, it seemed that this PLC instrument was more focused on an

assessment of one component of PLCs, Collective Learning, or collaboration. Sample questions included the following:

1. "My PLC team focuses on student learning rather than on teaching;"
2. "My PLC team discusses evidence of student academic progress at each PLC team meeting;" and
3. "My PLC team members are able to hold each other accountable for the results that lead to continuous student improvement."

As a result of my item examination, Roberts' study was included in the component analyses instead of the PLC composite analyses.

Swindler (2009) administered the *School Culture Survey* (Valentine, 2006) to a sample of teachers in North Carolina, South Carolina, and Georgia to assess components of school culture that correlate to student achievement on state assessments. On comparison of the items on the survey to the Hord components, several components of effective school culture were found to be comparable. Sample questions included:

1. *Collaborative Leadership – Shared and Supportive Leadership:* "Teachers are involved in the decision-making process" and "My involvement in policy or decision-making is taken seriously;"
2. *Teacher Collaboration – Collective Learning:* "Teachers have opportunities for dialogue and planning across grades and subjects" and "Teachers work together to develop and evaluate programs and projects;" and
3. *Unity of Purpose – Shared Vision:* "Teachers support the mission of the school" and "Teaching performance reflects the mission of the school;"

4. *Collegial Support – Supportive Conditions:* "Teachers trust each other" and "Teachers' ideas are valued by other teachers."

Terrell (2010) used the DLRS-1, an adaptation of the *Distributed Leadership Readiness Scale (DLRS)* (Connecticut State Department of Education), to assess distributed leadership components in elementary schools. The instrument assessed four components of the construct: Mission, Vision, and Goals; Culture; Shared Responsibility; and Leadership Practices. Both Mission, Vision, and Goals and Leadership Practices were determined to match Hord domains. Sample survey items for each construct included the following:

1. *Mission, Vision, and Goals – Shared Vision:* "Teachers and administrators understand and support a common mission for the school and can describe it clearly" and "Teachers and administrators collectively establish school goals and revise goals annually;" and
2. *Leadership Practices – Shared and Supportive Leadership:* "The school has expanded its capacity by providing professional staff formal opportunities to take on leadership roles" and "New teachers are provided opportunities to fill some school leadership roles."

Varano utilized the *Dimensions of the Learning Organization Questionaire (DLOQ*) (Watkins & Marsick, 1999) to assess the dimensions of learning organizations in a large sample of Pennsylvania high schools. Even though the instrument had been primarily used in the business sector, Chen (2004) and Kensler (2008) found the DLOQ to be effective in education research (Varano, 2010). The DLOQ provides scores for seven categories of individual, team, and organizational learning. These DLOQ components were compared to the Hord components to assure construct agreement:

1. *Create continuous learning opportunities – Supportive Conditions:* "In my organization, people are given time to support learning" and "In my organization, people are rewarded for learning;"
2. *Promote inquiry and dialogue – Collective Learning:* "In my organization, people give open and honest feedback to each other" and "In my organization, whenever people state their view, they also ask what others think;"
3. *Encourage collaboration and team learning – Collective Learning:* "In my organization, teams/groups focus both on the group's task and on how well the group is working" and "In my organization, teams/groups revise their thinking as a result of group discussions or information collected;"
4. *Empower people toward a collective vision – Shared Vision:* "My organization invites people to contribute to the organization's vision" and "My organization builds alignment of visions across different levels and work groups;" and
5. *Provide strategic leadership for learning – Shared and Supportive Leadership:* "In my organization, leaders empower others to help carry out the organization's vision" and "In my organization, leaders mentor and coach those they lead."

The other two components of the DLOQ, create systems to capture and share learning and connect the organization to its environment, did not directly correspond to Hord components of PLCs. Some of the questions in each category could have belonged in another group; therefore, the component to which the majority of questions ascribed was used.

Wheaton (2008) utilized her own survey to assess PLC characteristics: *Impact of School Climate and Structure on Continuous School Improvement*. Through her review of the literature,

Wheaton developed items for seven components of PLCs. In comparing her instrument to the Hord components, the following Wheaton components were equated to the Hord components:

1. *Organizational Structure – Shared Vision:* "The school district possesses written, formalized vision statements clearly specifying the direction to which the organization is committed in terms of achieving its mission." The respondents were then asked to check the groups of stakeholders which were included and the frequency of input from these stakeholders.
2. *Curriculum – Collective Learning:* "Teacher collaboration is the basis for designing a research-based curriculum that represents best practice in each subject area." The survey requests further information regarding the process of refining curriculum for the district or school and the types of data used.
3. *Collaboration – School Conditions:* "Please rate the existence of methods in which the district office provides and promotes collaborative opportunities for staff development in your school." This is the only specific question about collaboration. Even though collaboration is woven into other questions, it is not clear as to the author's definition. Since this question is concerned with the structure of collaboration, this component remained under School Conditions.
4. *Data Based Decision-Making – Collective Learning:* "Data used to generate staff development initiatives focused upon school improvement occur as follows." The use of data is interwoven into many questions.
5. *Staff Development – Collective Learning:* "As an instructional leader, please rate the existence of the following process characteristics as they relate to the school/district's staff development program." Options corresponding to this

question include preparing teachers to make decisions based on research and to teach them how to collaboratively improve their practice.

The overall survey, or PLC score, was not included in this analysis because the total survey was too different from the others in terms of assessing the construct of a PLC. Celebrations of Success and Academic Intervention were also excluded because they are not included in the Hord model.

Separate meta-analyses were conducted for each component of learning communities. The results are detailed by component and by school level.

Shared and Supportive Leadership

Six studies included the results necessary to calculate effect sizes in Shared and Supportive Leadership. Results indicated a very small, positive effect on student achievement in reading for those studies (d = .092). See the results in Table 7. Homogeneity was not violated in this analysis (p = .406).

Table 7

Effect Sizes for Shared and Supportive Leadership and Student Achievement in Reading

Author	Cohen's *d*	Standard Error	95% Confidence Interval	
			Lower Limit	Upper Limit
Cassity (2012)	-0.158	0.268	-0.684	0.367
Davis (2009)	0.606	0.375	-0.130	1.342
Isoye (2011)	0.006	0.159	-0.305	0.317
Swindler (2009)	0.092	0.302	-0.499	0.684
Terrell (2010)	0.430	0.248	-0.057	0.916
Varano (2010)	0.010	0.189	-0.360	0.380
Random Model	0.092	0.094	-0.092	0.277

In order to see if the effects were different for elementary and secondary schools in the study, I analyzed the studies that included only elementary schools. The analysis of the Davis (2009) study and the Terrell (2010) study produced a significant, moderate effect size for Shared and Supportive Leadership in the two elementary studies (d = .483). The statistics for this analysis are included in Table 8. A test of homogeneity revealed that homogeneity was not violated (p = .695).

Table 8

Effect Sizes for Shared and Supportive Leadership and Student Achievement in Reading in Elementary Schools

Author	Cohen's *d*	Standard Error	95% Confidence Interval	
			Lower Limit	Upper Limit
Davis (2009)	0.606	0.375	-0.130	1.342
Terrell (2010)	0.430	0.248	-0.057	0.916
Random Model	0.483	0.207	0.078	0.889

An analysis of the studies of secondary schools resulted in a negligible effect, according to Hattie's and Cohen's guidelines, with an overall negative effect of d = -.007. See Table 9.

Table 9

Effect Sizes of Shared and Supportive Leadership and Student Achievement in Reading in Secondary Schools

Author	Cohen's *d*	Standard Error	95% Confidence Interval	
			Lower Limit	Upper Limit
Cassity (2012)	-0.158	0.268	-0.684	0.367
Isoye (2011)	0.006	0.159	-0.305	0.317
Swindler (2009)	0.092	0.302	-0.499	0.684
Varano (2010)	0.010	0.189	-0.360	0.380
Random Model	-0.007	0.104	-0.211	0.196

Six studies attempted to link Shared and Supportive Leadership to student achievement in math. One study indicated strong effects of the PLC component to student learning in math, while others demonstrated small or negative effects. The overall effect was positive, but minimal (d = .054). See Table 10.

Table 10

Effect Sizes of Shared and Supportive Leadership and Student Achievement in Math

Author	Cohen's *d*	Standard Error	95% Confidence Interval	
			Lower Limit	Upper Limit
Campoli (2011)	-0.400	0.311	-1.009	0.210
Davis (2009)	1.080	0.408	0.280	1.880
Isoye (2011)	0.092	0.159	-0.219	0.403
Swindler (2009)	-0.179	0.306	-0.779	0.421
Terrell (2010)	0.140	0.243	-0.336	0.617
Varano (2010)	-0.062	0.189	-0.433	0.309
Random Model	0.054	0.140	-0.221	0.329

I then ran an analysis to see if the three elementary studies would yield different results. The independent effects of the three studies were varied; however, the overall effect of the shared leadership component to student achievement in math was small, but positive (d = .229). See the results in Table 11. I found that homogeneity was violated on this particular analysis (p = .016).

In meta-analysis, it is assumed that each study in the analysis produces an effect size that is representative of the population effect (Wolf, 1986). According to Wolf, when homogeneity tests are conducted and the studies are found to be homogeneous, then it is assumed that the studies are testing the same hypothesis. When the analysis is found to be heterogeneous, then questions arise as to whether or not the individual studies are, in fact, testing the same premise

(Wolf, 1986). According to Wolf, heterogeneity indicates that it may not be wise to draw inferences from a study. In contrast, however, Harris and Rosenthal (1985) maintained that heterogeneity is common when there are multiple studies with different subjects and different methods (Wolf, 1986). Similarly, Becker and Hedges (1984) asserted that it may sometimes be permissible to make conjectures based on heterogeneous analyses (Wolf, 1986). Because the number of studies in this particular analysis was so few, I decided to leave all studies in the analysis. Readers, however, should take caution in making inferences from results considered to be heterogeneous.

Table 11

Effect Sizes of Shared and Supportive Leadership and Student Achievement in Math in Elementary Schools

Author	Cohen's *d*	Standard Error	95% Confidence Interval	
			Lower Limit	Upper Limit
Campoli (2011)	-0.400	0.311	-1.009	0.210
Davis (2009)	1.080	0.408	0.280	1.880
Terrell (2010)	0.140	0.243	-0.336	0.617
Random Model	0.229	0.371	-0.498	0.956

Analysis of the three studies which examined secondary schools resulted in individual effect sizes which were small, with two of the three exhibiting negative effects. The overall effect size computed for the secondary schools in this analysis was .000. See Table 12.

Table 12

Effect Sizes of Shared and Supportive Leadership and Student Achievement in Math in Secondary Schools

Author	Cohen's *d*	Standard Error	95% Confidence Interval	
			Lower Limit	Upper Limit
Isoye (2011)	0.092	0.159	-0.219	0.403
Swindler (2009)	-0.179	0.306	-0.779	0.421
Varano (2010)	-0.062	0.189	-0.433	0.309
Random Model	0.000	0.113	-0.221	0.222

Shared Vision

Seven studies which met the search criteria examined the relationship between Shared Vision and student achievement in reading. The synthesis of the seven studies resulted in a summary effect of d = .137, which was very small, but positive. See Table 13. Tests for homogeneity revealed that the studies were satisfactorily homogeneous and were assumed to be testing the same hypothesis (p = .069).

Table 13

Effect Sizes of Shared Vision and Student Achievement in Reading

Author	Cohen's *d*	Standard Error	95% Confidence Interval	
			Lower Limit	Upper Limit
Cassity (2012)	0.179	0.268	-0.347	0.705
Davis (2009)	0.622	0.376	-0.115	1.359
Isoye (2011)	0.140	0.159	-0.171	0.452
Swindler (2009)	-0.183	0.303	-0.776	0.411
Terrell (2010)	0.242	0.244	-0.237	0.721
Varano (2010)	-0.328	0.192	-0.704	0.047
Wheaton (2008)	0.738	0.346	0.060	1.415
Random Model	0.137	0.133	-0.124	0.398

To see if there were school level differences in the effect of the independent variable, I analyzed the two elementary level studies. This analysis resulted in a small to moderate effect on reading, d = .355, for schools where staff have shared understandings of their school's vision. See Table 14 for the results of this analysis. Homogeneity was not violated (p = .396).

Table 14

Effect Sizes of Shared Vision and Student Achievement in Reading in Elementary Schools

Author	Cohen's *d*	Standard Error	95% Confidence Interval	
			Lower Limit	Upper Limit
Davis (2009)	0.622	0.376	-0.115	1.359
Terrell (2010)	0.242	0.244	-0.237	0.721
Random Model	0.355	0.205	-0.047	0.756

The relationship for Shared Vision and student reading performance was not as pronounced in middle and high schools in this analysis. When computing the summary effect for secondary schools for this component, the Cohen's d was found to be .062, which indicated that shared understandings of the school's vision had little effect in the schools included in these studies. See Table 15.

Table 15

Effect Sizes of Shared Vision and Student Achievement in Reading in Secondary Schools

Author	Cohen's *d*	Standard Error	95% Confidence Interval	
			Lower Limit	Upper Limit
Cassity (2012)	0.179	0.268	-0.347	0.705
Isoye (2011)	0.140	0.159	-0.171	0.452
Swindler (2009)	-0.183	0.303	-0.776	0.411
Varano (2010)	-0.328	0.192	-0.704	0.047
Wheaton (2008)	0.738	0.346	0.060	1.415
Random Model	0.062	0.160	-0.251	0.376

The effects of Shared Vision on student learning in math were larger. The combination of the six studies which included the variables of Shared Vision and student learning in math resulted in a summary effect of d = .257. According to Hattie's (2009) guidelines, this was a small effect. When homogeneity was analyzed, the studies were found to be somewhat dissimilar (p = .008). The summary statistics for this analysis can be found in Table 16.

Table 16

Effect Sizes of Shared Vision and Student Achievement in Math

Author	Cohen's *d*	Standard Error	95% Confidence Interval	
			Lower Limit	Upper Limit
Davis (2009)	1.170	0.416	0.354	1.986
Isoye (2011)	0.238	0.160	-0.075	0.551
Swindler (2009)	0.199	0.307	-0.402	0.800
Terrell (2010)	0.100	0.243	-0.376	0.576
Varano (2010)	-0.341	0.192	-0.717	0.035
Wheaton (2008)	0.709	0.344	0.034	1.383
Random Model	0.257	0.183	-0.102	0.616

When the elementary studies, Davis and Terrell, were examined, large effects were found for Shared Vision on math achievement. With a summary effect of d = .582, the elementary schools in these studies demonstrated a strong relationship between teachers that shared the school's vision and student learning in math. According to Hattie's rubric, the effects of Shared Vision on math achievement would be visible in this case, based on a "hinge point" of d = .4. Homogeneity, however, was violated (p = .026).

Table 17

Effect Sizes of Shared Vision and Student Achievement in Math in Elementary Schools

Author	Cohen's *d*	Standard Error	95% Confidence Interval	
			Lower Limit	Upper Limit
Davis (2009)	1.170	0.416	0.354	1.986
Terrell (2010)	0.100	0.243	-0.376	0.576
Random Model	0.582	0.532	-0.462	1.625

When the Shared Vision component was analyzed in secondary schools, the summary effect, again, was much smaller. Although positive, the relationship between shared understandings of school staff in middle and high schools and student learning in math was very small, d = .150, according to Hattie (2009). The effects are presented in Table 18.

Table 18

Effect Sizes of Shared Vision and Student Achievement in Math in Secondary Schools

Author	Cohen's *d*	Standard Error	95% Confidence Interval	
			Lower Limit	Upper Limit
Isoye (2011)	0.238	0.160	-0.075	0.551
Swindler (2009)	0.199	0.307	-0.402	0.800
Varano (2010)	-0.341	0.192	-0.717	0.035
Wheaton (2008)	0.709	0.344	0.034	1.383
Random Model	0.150	0.207	-0.255	0.555

Collective Learning/Collaboration

A meta-analysis was conducted on eight studies which attempted to link Collective Learning attributes to student achievement in reading. When computing the summary effect for the analysis, a negative, very small effect on reading was found (d = -.012). The test of homogeneity indicated that it was not violated (p = .332). See Table 19.

Table 19

Effect Sizes of Collective Learning and Student Achievement in Reading

Author	Cohen's *d*	Standard Error	95% Confidence Interval	
			Lower Limit	Upper Limit
Cassity (2012)	0.110	0.268	-0.414	0.635
Cieslak (2011)	-1.155	0.577	-2.286	-0.023
Isoye (2011)	0.126	0.159	-0.186	0.437
Matthews (2009)	0.062	0.183	-0.296	0.420
Roberts (2010)	-0.032	0.168	-0.362	0.298
Swindler (2009)	-0.505	0.311	-1.115	0.104
Varano (2010)	-0.048	0.189	-0.419	0.322
Wheaton (2008)	0.197	0.326	-0.442	0.836
Random Model	-0.012	0.084	-0.177	0.153

School level as a moderating variable was also examined. Two elementary studies, Cieslak (2011) and Roberts (2010), attempted to link Collective Learning and reading achievement. Cieslak examined the results of collaborative learning on the reading achievement of Limited English Proficient (LEP) students. He found a large negative relationship between the two variables, indicating that as student achievement in reading increased for LEP students, the perception of Collective Learning decreased (d = -1.155). Roberts examined both elementary and secondary schools separately to determine the relationship between teacher learning and reading achievement. In the elementary analysis, she found a very small, but positive relationship between the two variables (d = .100). The overall effect was negative and moderate (d = -.410), and homogeneity was violated (p = .040). The results are presented in Table 20.

Table 20

Effect Sizes of Collective Learning and Student Achievement in Reading in Elementary Schools

Author	Cohen's *d*	Standard Error	95% Confidence Interval	
			Lower Limit	Upper Limit
Cieslak (2011)	-1.155	0.577	-2.286	-0.023
Roberts (2010)	0.100	0.197	-0.287	0.487
Random Model	-0.410	0.616	-1.618	0.798

When the effects of Collective Learning were examined for middle and high schools, a negligible effect was found for reading achievement (d = .002). Four of the study effects were very small but positive, while three effects were negative, two were moderate and negative. The combination of these studies did not violate homogeneity (p = .496). See Table 21.

Table 21

Effect Sizes of Collective Learning and Student Achievement in Reading in Secondary Schools

Author	Cohen's *d*	Standard Error	95% Confidence Interval	
			Lower Limit	Upper Limit
Cassity (2012)	0.110	0.268	-0.414	0.635
Isoye (2011)	0.126	0.159	-0.186	0.437
Matthews (2009)	0.062	0.183	-0.296	0.420
Roberts (2010)	-0.408	0.345	-1.085	0.268
Swindler (2009)	-0.505	0.311	-1.115	0.104
Varano (2010)	-0.048	0.189	-0.419	0.322
Wheaton (2008)	0.197	0.326	-0.442	0.836
Random Model	0.002	0.085	-0.164	0.167

The effect of Collective Learning on student achievement in math was examined. For the seven studies included in this analysis, an overall summary effect of d = .043 was calculated, indicating a positive, but very small effect on math achievement. Homogeneity was examined and was found to be acceptable (p = .713). See Table 22.

Table 22

Effect Sizes of Collective Learning and Student Achievement in Math

Author	Cohen's *d*	Standard Error	95% Confidence Interval	
			Lower Limit	Upper Limit
Campoli (2011)	0.285	0.308	-0.319	0.889
Isoye (2011)	0.203	0.159	-0.109	0.516
Matthews (2009)	0.018	0.183	-0.340	0.376
Roberts (2010)	-0.191	0.181	-0.546	0.164
Swindler (2009)	0.010	0.305	-0.588	0.608
Varano (2010)	-0.034	0.189	-0.404	0.336
Wheaton (2008)	0.205	0.326	-0.434	0.844
Random Model	0.043	0.079	-0.113	0.199

Only two studies in this analysis, Campoli (2011) and Roberts (2010), examined elementary schools. Campoli's research resulted in an effect size of d = .285. According to Cohen and Hattie, this is a small effect. Roberts did a separate analysis with elementary schools and found that collaborative learning activities and math achievement were negatively correlated, with a small, negative effect (d = -.201). The results are in Table 23.

Table 23

Effect Sizes of Collective Learning and Student Achievement in Math in Elementary Schools

Author	Cohen's *d*	Standard Error	95% Confidence Interval	
			Lower Limit	Upper Limit
Campoli (2011)	0.285	0.308	-0.319	0.889
Roberts (2010)	-0.201	0.198	-0.589	0.187
Random Model	-0.015	0.236	-0.478	0.447

The rest of the studies were conducted with middle and high schools only. In analyzing the summary effect of collaborative learning in these studies, I found a very small, but positive effect for Collective Learning and math achievement in the secondary schools in this study.

Homogeneity was not violated (p = .916). The effect sizes and confidence intervals are included in Table 24.

Table 24

Effect Sizes of Collective Learning and Student Achievement in Math in Secondary Schools

			95% Confidence Interval	
Author	Cohen's *d*	Standard Error	Lower Limit	Upper Limit
Isoye (2011)	0.203	0.159	-0.109	0.516
Matthews (2009)	0.018	0.183	-0.340	0.376
Roberts (2010)	-0.140	0.486	-1.093	0.813
Swindler (2009)	0.010	0.305	-0.588	0.608
Varano (2010)	-0.034	0.189	-0.404	0.336
Wheaton (2008)	0.205	0.326	-0.434	0.844
Random Model	0.074	0.091	-0.104	0.252

The results for Collective Learning and student achievement in reading and math were very small, and sometimes negative. In examining the survey items for Collective Learning in each study, I found that these collaborative activities varied from study to study. Although these activities seemed to fit into the Hord concept of Collective Learning, a lack of consistency in these activities may have contributed to the mixed results.

Shared Personal Practice

Only two studies attempted to link Shared Personal Practice to student achievement in reading, Cassity (2012) and Cieslak (2011). The overall summary effect for these two studies was d = -.478, which was a moderate effect, according to Cohen. Hattie (2009) would classify this relationship as one in which the results would be visible in student learning. This negative relationship indicated that as teachers worked together to observe each other's teaching and offer constructive feedback, student achievement in reading declined. See the results in Table 25.

Homogeneity for these studies was violated (p = .034), indicating a discrepancy between the hypotheses these dissertations were testing.

Table 25

Effect Sizes of Shared Personal Practice on Student Achievement in Reading

			95% Confidence Interval	
Author	Cohen's *d*	Standard Error	Lower Limit	Upper Limit
Cassity (2012)	0.082	0.267	-0.442	0.606
Cieslak (2011)	-1.218	0.552	-2.299	-0.136
Random Model	-0.478	0.644	-1.740	0.783

Cassity (2012) examined shared practice and reading achievement in middle and high schools and found a very small, although positive effect in the schools she analyzed (d = .082). On the contrary, Cieslak (2011) analyzed the results of shared practice in elementary schools and found a large, negative correlation between teacher shared practice and reading achievement (d = -1.218). Because only one study in each category was available, no separate analyses were conducted by school level. No studies meeting the search criteria for this meta-analysis examined Shared Personal Practice and student achievement in math. The implications of these results in reading, and lack of results in math, are discussed in Chapter V.

Supportive Conditions

Hord included five factors in her definition of Supportive Conditions: time to meet, collaborative school structures, communication processes, collegial trust, and caring relationships. Studies included in this component were compared based on the Hord model. Seven studies included some concept of school conditions which facilitate collaboration. One study, Kriznar (2011), analyzed student achievement as the independent variable and supportive conditions as the dependent variables. The analysis of the conditions resulted in a very small,

negative summary effect of d = -.098. In other words, as collaboration was facilitated through structural and relational factors, student achievement in reading slightly decreased. In this meta-analysis, homogeneity was violated, indicating variance in the individual effects (p = .010). The results are present in Table 26.

Table 26

Effect Sizes of Supportive Conditions and Student Achievement in Reading

			95% Confidence Interval	
Author	Cohen's *d*	Standard Error	Lower Limit	Upper Limit
Cassity (2012)	-0.052	0.267	-0.576	0.472
Cieslak (2011)	-1.424	0.614	-2.627	-0.221
Davis (2009)	0.225	0.361	-0.483	0.934
Kriznar (2011)	-0.110	0.265	-0.630	0.410
Swindler (2009)	0.534	0.312	-0.078	1.146
Varano (2010)	0.223	0.190	-0.149	0.596
Wheaton (2008)	-0.920	0.357	-1.620	-0.220
Random Model	-0.098	0.195	-0.480	0.285

Since this component consisted of several different constructs, I again looked at the Supportive Conditions survey items in each study. Cassity (2012) and Cieslak (2011) used the SPSLCQ to assess this component, which included all five facets of Supportive Conditions. Davis (2009) and Wheaton (2008) examined formal school structures and time to establish a link with student learning. Kriznar (2011) surveyed participants to determine the extent that teachers shared the same students and were provided time to meet collaboratively. Varano (2010) assessed time for collaboration, as well as rewards for doing so. One researcher focused primarily on the relational concept of Supportive Conditions. Swindler (2009) compared the

relationships of trust, and feelings that ideas are valued, to student learning. He found a moderate effect on reading achievement (d = .534).

When the results for the studies were divided by elementary and secondary levels, the elementary analysis resulted in a moderate, negative relationship between Supportive Conditions and student achievement in reading (d = -.525) and a very small, negative result for middle and high schools (d = -.028). As in the overall analysis, homogeneity was violated in both the elementary (p = .021) and secondary (p = .026) analyses. Because structural and relational factors were included in these analyses, results should be interpreted with caution. See Table 27 for the elementary effects and Table 28 for the secondary statistics.

Table 27

Effect Sizes of Supportive Conditions and Student Achievement in Reading in Elementary Schools

			95% Confidence Interval	
Author	Cohen's *d*	Standard Error	Lower Limit	Upper Limit
Cieslak (2011)	-1.424	0.614	-2.627	-0.221
Davis (2009)	0.225	0.361	-0.483	0.934
Random Model	-0.525	0.821	-2.134	1.085

Table 28

Effect Sizes of Supportive Conditions and Student Achievement in Reading in Secondary Schools

Author	Cohen's *d*	Standard Error	95% Confidence Interval	
			Lower Limit	Upper Limit
Cassity (2012)	-0.052	0.267	-0.576	0.472
Kriznar (2011)	-0.110	0.265	-0.630	0.410
Swindler (2009)	0.534	0.312	-0.078	1.146
Varano (2010)	0.223	0.190	-0.149	0.596
Wheaton (2008)	-0.920	0.357	-1.620	-0.220
Random Model	-0.028	0.201	-0.423	0.367

The results for the effects of Supportive Conditions on math achievement were equally diverse. Six studies examined the effects of structural and relational supports for collaboration on student learning in math. When the summary effect was calculated, it was found to be very small and negative, d = -.037. Homogeneity was again violated (p = .005). Analyzing relational factors, Swindler found small, positive effects between these conditions and math achievement (d = .238). See the results in Table 29.

Table 29

Effect Sizes of Supportive Conditions and Student Achievement in Math

Author	Cohen's *d*	Standard Error	95% Confidence Interval	
			Lower Limit	Upper Limit
Cieslak (2011)	-1.155	0.577	-2.286	-0.023
Davis (2009)	0.661	0.378	-0.080	1.403
Kriznar (2011)	0.154	0.266	-0.366	0.675
Swindler (2009)	0.238	0.307	-0.364	0.840
Varano (2010)	0.279	0.191	-0.095	0.653
Wheaton (2008)	-0.966	0.360	-1.672	-0.260
Random Model	-0.037	0.237	-0.501	0.428

Two studies were included in the elementary analysis, Cieslak (2011) and Davis (2009). Cieslak included an examination of the math achievement of special education and LEP students in relation to Supportive Conditions and found a large, negative correlation between the variables, which was converted to a Cohen's *d* (-1.155). Davis found a large, positive effect for enabling collaborative structures in her study of elementary achievement in math (*d* = .661). In combination, the studies resulted in a small, negative effect (*d* = -.194) on math achievement, and the studies were found to be heterogeneous (*p* = .009). The results are presented in Table 30.

Table 30

Effect Sizes of Supportive Conditions and Student Achievement in Math in Elementary Schools

			95% Confidence Interval	
Author	Cohen's *d*	Standard Error	Lower Limit	Upper Limit
Cieslak (2011)	-1.155	0.577	-2.286	-0.023
Davis (2009)	0.661	0.378	-0.080	1.403
Random Model	-0.194	0.907	-1.971	1.583

The analysis of secondary schools resulted in a very small, negative effect on student learning in math (*d* = -.020). This analysis was also found to be heterogeneous (*p* = .020).

Table 31

Effect Sizes of Supportive Conditions and Student Achievement in Math in Secondary Schools

			95% Confidence Interval	
Author	Cohen's *d*	Standard Error	Lower Limit	Upper Limit
Kriznar (2011)	0.154	0.266	-0.366	0.675
Swindler (2009)	0.238	0.307	-0.364	0.840
Varano (2010)	0.279	0.191	-0.095	0.653
Wheaton (2008)	-0.966	0.360	-1.672	-0.260
Random Model	-0.020	0.247	-0.505	0.465

The results for the analyses of PLC components and student achievement in reading and math have been presented in this section. Heterogeneity was present in some of the analyses; therefore, these results should be interpreted with caution.

PLCs and Composite Student Achievement

Some researchers examined PLC components using either a composite of reading and math scores (Ervin, 2011;Vencel-Mobley, 2009) or a comparison of PLCs to schools with low, medium, and high achievement (Bynes, 2011; Turner, 2008). Bynes (2011) used the *Professional Learning Community Assessment-Revised (PLCA-R)* to assess PLC characteristics in her study. Both the PLCA and the PLCA-R assess Hord components and were found to be compatible to the Hord model as well. In Bynes' analysis, she used high and low performing status on state assessments as the predictor variable and linked this performance to PLC components, or the criterion variables.

Ervin (2011) used the *Collaboration Survey* (McHenry, 2009) to assess elements of teacher collaboration and administrative support for that collaboration. To determine whether survey items measured the constructs according to the Hord domains, I examined the items for each component. The following survey items are representative of each Hord component:

1. *Level of Teacher Collaboration – Collective Learning:* "My work with other teachers is beneficial to my students" and " The purpose of working collaboratively with other teachers is clear;" and
2. *Time Collaborating – Collective Learning:* "Time in teacher meetings is divided equally between student concerns, curricular issues, and teaching practices" and – "There are opportunities to meet with other teachers to accomplish goals" (Ervin, 2011).

The administrative support construct did not adequately address Shared and Supportive Leadership, so it was excluded from this study.

Turner (2008) utilized an adapted survey to assess leadership components which correlated with PLC components, based on the Hord model. The items are as follows:

1. School Vision, Mission, Culture – Shared Vision: "The school vision sets the stage for how staff members proceed with instruction" and "The vision for the school is the key for school change in my school;"
2. Collaboration and Shared Leadership – Shared and Supportive Leadership: "Leadership in the school is shared between the principal and staff" and "Staff members make decisions concerning teaching and learning with the principal."

The other three components of the Turner survey were Curriculum and Classroom Instruction, Family and Community Relations, and Effective Management. These domains were not comparable to the Hord PLC characteristics.

Vencel-Mobley (2009) used a researcher-developed instrument, *Survey of Principal Leadership Practices*, to assess learning community characteristics in her study of Indiana principals. Even though the correlation between the composite score on the survey and student achievement on the *Indiana Statewide Testing of Educational Progress (ISTEP+)* and the *Indiana Qualifying Exam (GQE)* was reported, this statistic was not included in this analysis. The researcher instrument, as a whole, was determined to be too different from the Hord instrument and assessed some different domains. Some of the survey components were, however, considered to measure Hord components, so these components were used in this analysis. In the survey, principals were asked how often they participated in the activities listed below:

1. *FAC 2 – Shared and Supportive Leadership:* "…create opportunities for staff to have a voice in decisions related to teaching and learning" and "…draw on staff expertise in developing school improvement initiatives;"
2. *FAC 5 – Supportive Conditions:* "…take part in professional learning opportunities as a colleague" and "…develop policies, in collaboration with teacher leaders and unions, that provide teachers with time and resources to act on district and school improvement plans;" and
3. *FAC 8 – Shared and Supportive Leadership:* "…work with staff to set goals for learning improvement" and "…create positions that share instructional leadership with the principal."

Other components were included in Vencel-Mobley's survey; however, they were not compatible with Hord domains. They were excluded from this analysis.

Shared and Supportive Leadership

Three studies reported a quantitative link between Shared and Supportive Leadership and some form of student achievement. In converting the statistics from the individual studies into effect sizes, or Cohen's *d*s, small effects of the PLC component were found on overall student achievement. Bynes and Turner compared this shared leadership component in high and low performing schools, while Vencel-Mobley examined its effects on students who passed both English and Math subtests of Indiana state assessments. The summary effect was calculated to be $d = .160$, which was considered to be a very small, but significant effect. In this analysis, homogeneity was not violated ($p = .857$). Effect sizes and confidence intervals are included in Table 32.

One should take caution in interpreting the results from this analysis. Turner (2008) used ANOVA to determine if there were differences in PLC implementation among the achievement levels of high, medium, and low achieving schools, based on results from his survey ($F = 2.1985$, $p = .114$). Since his analysis of Shared and Supportive Leadership was not significant, he did not present the mean differences in the survey results for the three achievement levels. It may be possible that the highest achieving schools did not have the highest means on the PLC survey.

Table 32

Effect Sizes of Shared and Supportive Leadership and Student Achievement Composite

			95% Confidence Interval	
Author	Cohen's *d*	Standard Error	Lower Limit	Upper Limit
Bynes (2011)	0.191	0.169	-0.140	0.521
Turner (2008)	0.229	0.156	-0.077	0.536
Vencel-Mobley (2009)	0.140	0.071	0.001	0.280
Random Model	0.160	0.060	0.042	0.279

Shared Vision

Bynes (2011) and Turner (2008) analyzed the effects of a school's Shared Vision on student achievement. With each exhibiting small to moderate effects on student achievement, the summary effect was moderate and significant ($d = .427$). According to Hattie (2009), the effect of PLC implementation in the schools in these studies would have been easily observed in increases in student achievement on standardized assessments. Homogeneity was not violated ($p = .297$). The results are presented in Table 33.

Readers, however, should take caution in interpreting this analysis. Upon further examination of the Turner ANOVA results, I found that the highest achieving schools did not have the highest means on the PLC survey. There were differences in the survey results for each

achievement level: high, medium, and low achievement (F = 12.204, p = .0001). These differences, however, were not in alignment with the hypotheses in this study.

Table 33

Effect Sizes of Shared Vision and Student Achievement Composite

			95% Confidence Interval	
Author	Cohen's *d*	Standard Error	Lower Limit	Upper Limit
Bynes (2011)	0.299	0.170	-0.033	0.632
Turner (2008)	0.543	0.161	0.228	0.858
Random Model	0.427	0.122	0.189	0.666

Collective Learning

In the Collective Learning analysis, two studies met the search criteria. Bynes' t-test statistic was converted into a moderate Cohen's *d* (d = .415). Ervin's study analyzed two Collective Learning components. Her *t* statistics from the hierarchical regression analysis yielded two Pearson *r* coefficients which were averaged and input into the CMA program. This yielded a Cohen's *d* of .430 for her study. When the Bynes and Ervin studies were analyzed, a summary effect of d = .419 was calculated. According to Hattie, this effect size would indicate a visible effect in student learning. Homogeneity was considered to be acceptable (p = .962). See the results in Table 34 below.

Table 34

Effect Sizes of Collective Learning and Student Achievement Composite

			95% Confidence Interval	
Author	Cohen's *d*	Standard Error	Lower Limit	Upper Limit
Bynes (2011)	0.415	0.171	0.079	0.751
Ervin (2011)	0.430	0.262	-0.084	0.943
Random Model	0.419	0.143	0.138	0.700

Shared Personal Practice

Bynes (2009) was the only study which reported a relationship between Shared Personal Practice and a composite form of achievement. Using *t*-test analyses, Bynes reported a *t* value of 4.23, which was converted to an effect size of $d = .706$. According to Hattie's guidelines, this is a large effect, one in which learning would be visible. Shared Personal Practice was elusive in this search for quantitative studies. This concept will be discussed further in Chapter V.

Supportive Conditions

Vencel-Mobley and Bynes examined the effects of Supportive Conditions on student achievement. In Bynes' study, a small effect was calculated for this PLC component ($d = .213$). Vencel-Mobley established a modest link between the two ($d = .090$). In combination, a very small, but positive overall effect for Supportive Conditions was calculated ($d = .109$). Homogeneity was not violated in this analysis ($p = .501$). The results are presented in Table 35.

Table 35

Effect Sizes of Supportive Conditions and Student Achievement Composite

			95% Confidence Interval	
Author	Cohen's *d*	Standard Error	Lower Limit	Upper Limit
Bynes (2011)	0.213	0.169	-0.118	0.544
Vencel-Mobley (2009)	0.090	0.071	-0.049	0.229
Random Model	0.109	0.065	-0.020	0.237

Even though this analysis yielded a very small summary effect, further examination of the two individual studies is warranted. Bynes used the PLCA-R to assess both relational and structural conditions which supported collaboration, while Vencel-Mobley's survey focused primarily on the structural factors. As in the analyses of Supportive Conditions to reading and

math achievement in the previous section, assessment of the relational factors may have made a greater contribution than the organizational ones.

In these analyses, small to moderate effects were found for PLC components and student learning. Collective Learning and Shared Personal Practice results indicated that visible gains in student learning may have occurred as a result of teacher collaboration.

Composite PLC Score and Composite Achievement

Applegate (2008) examined PLC implementation in Oklahoma Educational Technology Trust / Oklahoma: Achievement through Collaboration and Technology Support (OETT/OK-ACTS) Grant schools, or schools which received assistance in technology and professional development between 2003 and 2006, in Oklahoma. As part of the professional development, schools received training in technology integration and in the implementation of professional learning communities in their schools (Applegate, 2008). According to Applegate, teachers were given a pre- and post-assessment of the SPSLCQ. Using the post assessment only, Applegate correlated the survey results to the API, or Academic Performance Index, for participating schools to determine if there was a link between student achievement and PLC implementation.

The API in Oklahoma, at the time of the study, was a measure of student academic growth which was composed of different factors (Applegate, 2008). According to state guidelines (O.S.D.E, 2006), API for high schools included the following components:

1. Student achievement on Algebra I and English II end-of-course tests (80%);
2. Attendance, graduation, and dropout rates (10%); and
3. The percentage of students who took the ACT and their average score, the percentage of students who took AP courses, and the percentage of students who required remedial courses upon enrolling in college (Applegate, 2008).

Based on this one analysis, there was a very small, negative relationship between PLCs and the schools' API scores (d = -.146). This result indicated that as PLC implementation increased, the API scores decreased slightly. According to Applegate, other factors may have influenced this relationship. This correlation was based on only one year of API data, the year the schools received the grant. Had there been more API data included, a different relationship may have been found (Applegate, 2008). Similarly, schools had been working as PLCs for only one year; thus, a later examination of PLC characteristics may have yielded different outcomes. Finally, according to the researcher, the small number of schools involved (N = 22) may have also influenced the data.

No meta-analysis was conducted on composite scores of PLCs and composite achievement because Applegate (2008) was the only study in this category which met the analysis criteria. This study will, however, be included in the summary effect size.

PLC Implementation and Student Achievement over Time

Burdett (2009) utilized data from the *Early Childhood Longitudinal Study: Kindergarten Class of 1998-99 (ECLS-K)*, a national study, to examine the effects of PLC components on student achievement in reading and math over time. The sample size of this study was exponentially larger than any other in this analysis (N = 10,622); therefore, including it in the analyses with the other studies would have given this particular dissertation inordinate influence in the overall effect size of each PLC component. As a result, I decided to examine the components of this study in isolation to ascertain the effects of PLCs over time.

Burdett did not include the survey items; however, he did describe each component in detail. He based his study on the five Hord components which he subcategorized into the

components of Support and Collaboration. For the purposes of this analysis, I reclassified these components into Hord domains:

1. *Lesson Planning – Collective Learning:* The survey item(s) asked how many times teachers met to plan lessons together (Burdett, 2009).

At first glance, this question seemed to address supportive conditions of time allotted for teachers to meet; however upon further examination, the question was asking how many times they planned lessons together, which was clearly an indication of collective learning. The format of this question is the same as in the SPSLCQ.

2. *Mission of the School – Shared Vision:* "There is broad agreement among the entire school faculty about the central mission of the school" (Burdett, 2009, p. 54).

Although the terms "vision" and "mission" are often considered to be distinctive at the conceptual level, in this particular case, they were used interchangeably. Because there is widespread acceptance of the school's mission, or what they are corporately trying to accomplish, this acceptance implied agreement about where they were going, or a common vision.

3. *Support and Encourage – Shared and Supportive Leadership:* "The school administration's behavior toward the staff is supportive and encouraging" (Burdett, 2009, p. 54).
4. *Discuss Curriculum – Collective Learning:* The survey item asked how many times teachers met to discuss matters of curriculum and instruction.

Again, this item could be considered a Supportive Condition based on the time to discuss curriculum. In this case, however, the intent of the question was to assess the number of times

that teachers met to conduct this activity, which is more closely associated with activities in the Collective Learning domain.

5. *Colleague – Supportive Conditions:* "I feel accepted and respected as a colleague by most staff members."

This statement is clearly a relational component of a supportive environment.

6. *Impact Policy – Shared and Supportive Leadership:* this domain was associated with teachers' perceptions of "how much they influence policy decisions for the school" (Burdett, 2009, p. 55).

Parent Support and Vision were two components not included in this analysis. Even though parental support is important to schools, this construct is not associated with the Hord PLC components. In this particular study, Vision was described with the statement: "The school administrator knows what kind of school he/she wants and has communicated it to the staff" (ECLS-K). The latter part of the statement indicates that the vision has been developed by the principal and disseminated, without staff participation. Therefore, this component was excluded and the mission component was used instead.

Burdett used a multi-level growth model to examine the relationship between PLC component implementation and student achievement in reading and math over time, specifically growth between kindergarten and third, and between kindergarten and fifth grade. Two of Burdett's components, Support and Encourage and Impact Policy, were comparable to Hord's Shared and Supportive Leadership component. Students in the classes of teachers who indicated that they did not feel supported and encouraged by their administration experienced mean growth of 56.72 points in reading item response theory (IRT) performance from kindergarten to third grade (Burdett, 2009). From kindergarten to fifth grade, this growth was 89.02 points. In

contrast, students in classes where teachers reported feeling highly supported by their administrators experienced mean growth of 63.80 points, which was 7.08 points higher from kindergarten to third grade than students in classes with teachers who did not feel such support (Burdett, 2009). Moreover, students in classes with supported teachers experienced mean growth of 96.50 points, which was 7.48 points higher than their counterparts between kindergarten and fifth grade. Using Cohen's kappa effect sizes, Burdett computed an effect size (κ) of .86 for Support and Encourage, which Cohen (1998) considers a large effect (Burdett, 2009).

Burdett's component, Impact Policy, corresponded to Shared and Supportive Leadership. Students in classes with teachers who reported little involvement with policy decisions experienced mean growth of 61.18 points from kindergarten to third grade, and mean growth of 92.92 points on IRT reading from kindergarten to fifth grade (Burdett, 2009). On the contrary, students in classes with teachers who were more optimistic about their ability to impact policy experienced mean growth of 64.69 points by third grade and 97.09 points by fifth grade on the reading assessment. This growth translated into mean differences of 3.51 points and 4.17 points, respectively by grade level. The effect size (κ) for Impact Policy was .40, which was determined to be a medium effect (Burdett, 2009).

Burdett examined Mission of the School in relation to student achievement in reading. According to him, students in classes where teachers did not feel that there was broad acceptance of the school mission experienced reading growth of 54.91 points from kindergarten to third grade, and 86.68 points from kindergarten to fifth grade. Where teachers felt a strong agreement on the mission of the school, students' mean growth was 63.39 points by third grade, and 95.92 points by fifth grade. Students in classes where teachers felt more agreement on the school's

mission achieved at a rate of 8.48 points and 9.24 points higher, respectively. Burdett calculated an effect size (κ) of .96, which was considered to be a large effect.

Lesson Planning, or Collective Learning, was examined in relation to reading achievement (Burdett, 2009). Students with teachers who reported never meeting with colleagues to plan lessons experienced mean reading IRT growth of 65.95 points from kindergarten to third grade and 98.49 points from kindergarten to fifth grade. Students in classes with teachers reporting daily meetings to plan lessons experienced mean growth of 67.95 points. Moreover, students in classes with teachers who met daily to plan lessons experiences mean growth of 100.99 points from kindergarten to fifth grade. This growth was 2.00 points higher than their counterparts from kindergarten to third grade and 2.50 points higher from kindergarten to fifth grade. Burdett calculated an effect size (κ) of .11 for Lesson Planning, which, based on Cohen's guidelines, was determined to be small.

Teachers who never met to Discuss Curriculum, or to participate in Collective Learning, had students who experienced mean growth in reading IRT achievement of 68.35 points from kindergarten to third grade, and 101.64 points from kindergarten to fifth grade (Burdett, 2009). Conversely, students in classes where teachers indicated they met frequently to discuss curriculum experienced growth of 66.65 points, which was 1.70 points lower than students with more isolated teachers in kindergarten to third grade classrooms. Moreover, there was also a decrease in the mean IRT scores of students from kindergarten to fifth grade in classrooms where teachers more frequently collaborated around curriculum. Students in classes with teachers who reported the highest level of collaboration experienced mean growth of 98.84 points. On average, this growth was 2.80 points lower than students in classrooms of teachers where curriculum was

seldom discussed. The effect size (κ) was found to be -.03, which was a small negative effect (Burdett, 2009).

Burdett examined the effects of the Colleague component, or the extent to which a teacher feels accepted as a colleague by others in his or her school. In the Hord model, Colleague translates to Supportive Conditions. For students in classes with teachers who did not feel supported as a colleague, their students grew 46.87 points from kindergarten to third grade and 76.77 points from kindergarten to fifth grade on reading IRT scores. In classes where teachers felt highly accepted by their colleagues, the mean reading achievement growth was 59.67, or 12.80 points higher in third grade. Students in classes where teachers felt highly accepted experienced mean growth of 91.45 from kindergarten to fifth grade, or 14.68 points higher when compared to students of teachers who felt less accepted. Burdett found the effect size (κ) of 1.24 for Colleague to be large, according to Cohen's (1998) guidelines.

Burdett (2009) examined the implementation of PLC components and math IRT achievement growth. For students who were in classes of teachers who did not feel encouraged and supported by the administration, mean growth on the math IRT from kindergarten to third grade was 44.43 points and 69.65 points from kindergarten to fifth grade. In comparison, students of teachers who felt the highest support and encouragement from their administration experienced mean growth of 50.11 points, which was 5.68 points higher than students of teachers in less supported classrooms. Students in supported classrooms experienced mean math growth of 76.21 points, 6.56 points higher, by fifth grade. According to Burdett, the effect size (κ) for Support and Encourage, or Shared and Supportive Leadership according to this analysis, was .20 for math. Citing Cohen (1998), Burdett indicated this was a small effect.

Burdett's component of Impact Policy parallels Shared and Supportive Leadership. Students of teachers who reported having little influence over school policy experienced mean math IRT growth of 47.71 points from kindergarten to third grade and 73.16 points from kindergarten to fifth grade. Conversely, students in classes of teachers who felt more control over school policy experienced higher math IRT growth, namely 51.75 points by third grade and 78.04 points by fifth grade. These are differences of 4.04 points and 4.88 points, respectively. Burdett reported an effect size (κ) of .38, which according to Cohen's (1998) guidelines, was considered to be a small effect.

In the component of Mission of the School, or Shared Vision according to Hord, Burdett found that for students in classes with teachers who disagreed that there was widespread agreement on the central mission of the school, growth on the math IRT from kindergarten to third grade was 43.27 points, and the same comparison from kindergarten to fifth grade resulted in mean growth of 68.49 points. Conversely, in teachers' classes where staff indicated there was broad agreement on the mission of the school, mean student math achievement was 49.95 points, or 6.68 points higher in third grade. In classes where teachers indicated broad agreement on the school mission, student mean math IRT growth was 76.09, or 7.60 points higher in fifth grade. According to Burdett, these statistics indicated an effect size (κ) of .25, and citing Cohen (1988), he indicated this was a small effect.

In his analyses of collaborative Lesson Planning, Burdett found that students in classes with teachers who had the lowest level of support, or those who never planned lessons together, experienced a mean growth of 50.88 points between kindergarten and third grade and 76.82 points between kindergarten and fifth. Conversely, students in classes with teachers who experienced the highest level of support, or those who daily planned lessons with colleagues,

exhibited mean growth of 53.93 points, which was 3.05 points higher on math IRT achievement in the third grade. By fifth grade, students of teachers who felt highly supported exhibited mean math growth of 80.72 points, 3.90 points higher than the other group of students (Burdett, 2009). Burdett reported an effect size (κ) of .06 for Lesson Planning, a small effect on math IRT achievement.

Discuss Curriculum was analyzed in relation to math IRT achievement. According to Burdett, a student in a class with a teacher who reported never meeting to discuss curriculum experienced mean growth of 53.02 points from kindergarten to third grade, and 79.49 points from kindergarten to fifth grade. For students in classes of teachers who reported meeting frequently to collaborate with their peers on curriculum, student growth was 53.07 points, or .05 points higher than students in classrooms where teachers never met to discuss curriculum. For students of teachers who met frequently to discuss curriculum matters, these students experienced mean growth of 79.69 points, .20 points higher than their counterparts by fifth grade. According to Burdett, these statistics translated into an effect size (κ) of .03, which again, according to Cohen (1998), is a small effect (Burdett, 2009).

In classes where teachers reported that they did not feel accepted as a Colleague, their students' achievement may have suffered. Students in these classes experienced mean growth of 37.49 points from kindergarten to third grade, and 60.33 points from kindergarten to fifth grade. The students of teachers who reported the strongest feelings of acceptance as a colleague experienced mean growth of 47.17 points, which was 9.68 points higher on math achievement in the third grade; and 72.33 points, which was 12.00 points higher in fifth grade than students of teachers who felt minimally accepted. The calculated effect size (κ) for Colleague was .82, which was considered to be a large effect size (Burdett, 2009).

In Burdett's (2009) analyses of PLC components in elementary schools over time, he found small effects in math IRT achievement and effects that tended to be moderate to large in reading. One small effect in math that was approaching the moderate level was the Impact Policy component. Burdett found that teachers who felt more control over policy decisions had students who experienced higher IRT scores in math over time. One anomaly in the math effects was the Colleague component. According to Burdett, when teachers felt fully accepted and supported as colleagues, their students demonstrated significantly higher achievement in math ($\kappa = .82$).

Burdett (2009) found moderate to large effects in reading achievement over time. As in math, when teachers felt they had some control over matters of policy, the Impact Policy component, their students achieved in reading at a higher rate than students of their counterparts ($\kappa = .40$). Colleague, Support and Encourage, and Mission of the School were found to have large effects on student IRT scores in reading over time. Based on the extent that teachers felt accepted as colleagues ($\kappa = 1.24$), felt supported and encouraged by administrators ($\kappa = .86$), and reported broad acceptance of a school-wide mission ($\kappa = .96$), students in these classes achieved more in reading (Burdett, 2009). One component was negatively related to reading achievement in this study, Discuss Curriculum. Burdett found that students with teachers who more frequently discussed curriculum with their colleagues had lower reading achievement than students of teachers who never discussed curriculum ($\kappa = -.03$). Burdett's findings are presented in Table 36.

Table 36

Effect Sizes (Cohen's κ) of PLC Components over Time

Burdett Component	Hord Component	Effect Size (Cohen's κ)	
		Reading	Math
Support and Encourage	SSL	0.86	0.20
Impact Policy	SSL	0.40	0.38
Mission of the School	SV	0.96	0.25
Lesson Planning	CL	0.11	0.06
Discuss Curriculum	CL	-0.03	0.03
Colleague	SC	1.24	0.82

Burdett used *Early Childhood Longitudinal Study: Kindergarten Class of 1998-99* (ECLS-K) data to examine the relationship of components related to teacher collaboration and student learning in reading and math over time, from kindergarten to third, and from kindergarten to fifth grade. Some studies in this meta-analyses looked at two or three years of data; however, Burdett analyzed the effects of PLC components on student learning in reading and math over several years. The implications of the results of Burdett's study will be further discussed in Chapter V.

Collective Efficacy, Professional Community, and Student Achievement

Two studies in this meta-analysis attempted to measure collective efficacy as a mediating variable between PLCs and student achievement. Cassity (2012) used the SPSLCQ and the *School Academic Optimism Scale (SAOS)* (Hoy, 2005) to assess the relationship between collective efficacy and professional learning communities, and the effects of each on student achievement in reading, as measured by state assessments in Alabama. She found a significant relationship between collective efficacy and teacher participation in learning communities

overall (r = .338, p = .009) as well as significant relationships between collective efficacy and PLC components (see Table 37). Cohen's *d* coefficients were calculated for each Pearson *r*.

Table 37

Correlations between PLC Implementation and Collective Efficacy (Cassity, 2012)

	Collective Efficacy (CES)		Calculated Cohen's *d*
	Pearson *r*	Sig.	
SPSLCQ Composite	0.338	0.009	0.718
Shared and Supportive Leadership	0.131	0.323	0.264
Shared Vision	0.332	0.010	0.704
Collective Learning	0.372	0.004	0.802
Shared Personal Practice	0.185	0.161	0.376
Supportive Conditions	0.308	0.018	0.647

Examining the effects of collective efficacy on student achievement in reading, she found a positive, significant relationship between the two variables (r = .604, p = .000). The Pearson coefficient was transformed to a large Cohen's *d* (1.516). Although none of the relationships between professional learning communities and student achievement were significant, collective efficacy was found to be linked to both PLC implementation and reading achievement in this study.

Gallozzi (2011) asked the research question, "Does the presence of characteristics of an effective learning organization correlate with the level of collective efficacy within a school?" (p. 50). She used Pearson correlation coefficients to test for these relationships. Using the SPSLCQ and the *Collective Efficacy Scale (CES)* (Goddard, 2002), she found statistically significant correlations between the composite SPSLCQ score and the CES (r = .476, p = .000), as well as between the CES and PLC components. In this particular study, collective efficacy was significantly related to all Hord PLC components except Shared and Supportive Leadership (r =

.138, p = .334). Cohen's d values were calculated for each Pearson r. These coefficients are presented in Table 38.

Table 38

Correlations between PLC Implementation and Collective Efficacy (Gallozzi, 2011)

	Collective Efficacy (CES)		Calculated Cohen's *d*
	Pearson *r*	Sig.	
SPSLCQ Composite	0.476	0.000	1.083
Shared and Supportive Leadership (LC1)	0.138	0.334	0.279
Shared Vision (LC2)	0.293	0.037	0.613
Collective Learning (LC3)	0.341	0.014	0.725
Shared Personal Practice (LC4)	0.296	0.035	0.620
Supportive Conditions (LC5)	0.580	0.000	1.424

Gallozzi's second research question attempted to demonstrate a relationship between collective efficacy, PLCs, and student growth on the *Colorado Student Assessment Program (CSAP).* While she found positive, non-significant correlations between PLCs and student growth in reading (r = .095, p = .589, d = .191) and math (r = .168, p = .334, d = .341), Gallozzi discovered that collective efficacy was negatively correlated to growth in reading achievement (r = -.273, p = .112, d = -.568) and math achievement (r = -.175, p = .316, d = -.355). In other words, as the collective efficacy of teachers increased, student achievement in reading and math decreased in these elementary schools. These negative correlations for collective efficacy and student achievement appear to be in direct conflict with results from the literature (Bandura, 1993; Goddard, 2001; Goddard et al., 2000; Goddard et al., 2004; McCoach & Colbert, 2010; Moolenaar et al., 2011).

In analyzing the mean SPSLCQ scores by component, Gallozzi found interesting results which may shed light on the lack of significant correlations with student achievement. On

component LC1, or Shared and Supportive Leadership, results indicated that administrators involved teachers in most decisions; however, this involvement was most often accomplished by committees or leadership teams. The entire staff was usually not involved in the decision-making process (Gallozzi, 2011). In the second component of PLCs, or Shared Vision, most teachers were involved in the development of the school improvement vision, according to the researcher. The survey also indicated that the vision was focused on student learning. Upon further analysis, however, survey results revealed that most of the schools did not target "high quality learning for all students" (Gallozzi, 2011, p 44), instead they focused on student ability.

On LC3, or the Collective Learning component, teachers indicated that subgroups met together to learn "with and from each other" (p. 45). While survey results indicated that the staff members often had conversations centering on student learning issues and their associated instructional practices, conversations may not have addressed the quality of instruction (Gallozzi, 2011). According to the survey responses, teachers frequently assessed their instruction but far less often changed their instruction to meet student needs.

The lowest mean scores were on the fourth component of PLCs (m = 2.75; m = 2.92). Shared Personal Practice scores indicated that in most of the elementary schools surveyed, teachers infrequently visited each other's classrooms. When this did happen, there was little reflection based on these observations (Gallozzi, 2011).

On component LC5, Supportive Conditions, responses indicated that time was frequently preserved to meet as learning teams. There was frequent interaction and communication among staff members. The relational factors of trust and caring relationships, however, were not as pervasive in these elementary schools (Gallozzi, 2011).

Both Cassity and Gallozzi found significant, positive relationships between collective efficacy and PLC implementation. The results of the meta-analysis are in Table 39. Homogeneity was found to be acceptable (p = .401). Upon further investigation, PLC components were linked to collective efficacy. Three of the five components demonstrated significant relationships to collective efficacy; however shared leadership and shared practice were not consistently related to collective efficacy in these studies. The effects of collective efficacy on student achievement were mixed (see Table 40), and homogeneity was violated (p = .000). Further research on these constructs and their combined effects on student learning may be warranted. The implications of these results are discussed in Chapter V.

Table 39

Effects of PLC Composite on Collective Efficacy

			95% Confidence Interval	
Author	Cohen's *d*	Standard Error	Lower Limit	Upper Limit
Cassity (2012)	0.718	0.284	0.162	1.275
Gallozzi (2011)	1.083	0.328	0.439	1.726
Random Model	0.874	0.215	0.453	1.295

Table 40

Effects of Collective Efficacy on Student Achievement in Reading

			95% Confidence Interval	
Author	Cohen's *d*	Standard Error	Lower Limit	Upper Limit
Cassity (2012)	1.516	0.335	0.858	2.173
Gallozzi (2011)	-0.568	0.300	-1.156	0.021
Random Model	0.469	1.042	-1.573	2.510

Summary

Chapter IV presented the results for the separate meta-analyses which were conducted on PLC implementation as a whole and student achievement, and on individual PLC components and student achievement. PLC implementation over time was examined, as well as the relationships between collective efficacy and PLC characteristics and between collective efficacy and student achievement. To verify that the PLC survey instruments were measuring comparable components, the survey items used to measure each component, or the overall composite score, were described in detail. The implications of this research are discussed in Chapter V.

CHAPTER V:

CONCLUSIONS

Introduction

This chapter presents a review of the problem, methodology, and research questions of this study. Building upon the results that were discussed in Chapter IV, this chapter will analyze these results in light of the research hypotheses. Limitations of this study will be presented as well as implications for practice and future research.

Statement of the Problem

The cost of professional learning for teachers accounts for the largest portion of school reform budgets (Desimone et al., 2006). Since schools and districts are charged with spending these funds wisely, perhaps more research should be conducted which establishes explicit links between specific types of professional learning and student outcomes (Desimone et al., 2006; Yoon et al., 2007).

The quality of teachers in the classroom can have lasting effects on students. According to Hattie's (2009) analyses, teachers account for 35% of the variance in classrooms (d = .49), and professional development for these teachers accounts for 44% (d = .62). Few teachers, however, have access to extended (Desimone et al., 2006), high quality (Corcoran et al., 2001; Guskey & Yoon, 2009; Wood, 2007) professional learning experiences. Historically, most "sit and get" workshops consist of lecture or discussion, with little opportunities to practice the newly acquired skill. Unless theory is combined with practice and peer coaching, transfer of the learning is not realized (Joyce & Showers, 2002).

One possible solution to issues of teacher quality and equity in the classroom is the implementation of learning communities in schools. According to Hord and colleagues, as teachers jointly develop a shared vision, share leadership and decision-making responsibilities, learn collectively, observe and offer feedback on practice, and experience structural and relational conditions which facilitate collaboration, student learning will increase. To date, however, empirical evidence has been mixed. The purpose of this analysis was to synthesize dissertation research for the last sixteen years, which included both significant and non-significant findings, to assess the strength of the relationship between PLC implementation and student learning in reading and math. Previous meta-analyses only examined published work; so, this analysis contributes the analysis of unpublished work to the research base.

Review of the Methodology

A meta-analysis methodology was used to examine the effects of PLC implementation on student achievement. There have been many studies, published and unpublished, which have attempted to quantitatively link these two variables with mixed results. The goal of this analysis was to quantitatively combine these results to determine the overall influence of teacher collaboration on student learning. Meta-analysis is defined as the process of converting the effects of comparable studies to common units, or effect sizes (Hattie, 2009), and calculating a weighted average of the effects based on sample size so that a determination of the cumulative findings can be made (Levine et al., 2008). The benefits of a meta-analysis lie in the larger sample size and greater statistical power than could be found in any one study (Levine et al., 2008).

An exhaustive search of dissertation databases was performed to find all quantitative studies which attempted to link learning community implementation in preK-12 schools to

student learning in reading and math. Using the search terms of "professional learning communities" and "student achievement", a total of 4,367 dissertations and theses emerged. Many of these studies, however, overlapped among the databases.

Search criteria included the following: (1) the studies were available on dissertation databases, (2) the studies originated from institutions with the classification of Carnegie Doctoral/ Research Universities-Extensive between 1997 and 2012, (3) the studies involved student achievement data from preK-12 schools , (4) the studies included some type of assessment of PLC characteristics and some form of student academic achievement data which were quantitatively linked, and (5) the studies reported the quantitative data necessary to calculate effect size, i.e., *r*, R^2, regression, ANOVA, or t-test data.

Initially, all studies which did not originate from Carnegie Doctoral Research Universities were removed from the list. The next screening process included reading the abstracts of the resulting studies, which reduced the eligible dissertations to 181. After reading the methodology and results chapters of these studies, 44 dissertations were considered to have met the criteria. Upon further analysis, only 21 studies were included in the final data set.

Analysis of Findings

Research Questions

The following research questions guided the focus of this meta-analysis. Based on available dissertation research from the last sixteen years,

(1) What is the relationship between the implementation of professional learning communities and student achievement in reading in preK-12 schools?

(2) What is the relationship between the implementation of professional learning communities and student achievement in math in preK-12 schools?

(3) What is the relationship between collective efficacy and professional learning communities in preK-12 schools, and the effects on student achievement?

Research Hypotheses

Null hypotheses are formulated to test the significance of the effect size of the meta-analysis. In this study, three null hypotheses were evaluated:

H_{01}: There is no significant relationship ($p \geq .05$) between the implementation of professional learning communities and student achievement in reading in preK-12 schools.

H_{02}: There is no significant relationship ($p \geq .05$) between the implementation of professional learning communities and student achievement in math in preK-12 schools.

H_{03}: Neither collective efficacy nor teacher efficacy are mediating variables ($p \geq .05$) between professional learning communities and student achievement in preK-12 schools.

The research hypotheses for this study were evaluated:

H_1: There is a significant ($p < .05$), positive relationship between teachers' participation in professional learning communities and student achievement in reading in preK-12 schools.

H_2: There is a significant ($p < .05$), positive relationship between teachers' participation in professional learning communities and student achievement in math in preK-12 schools.

H_3: Collective and teacher efficacy are mediating variables ($p < .05$) between professional learning communities and student achievement in preK-12 schools.

Although not hypothesized, a summary analysis was performed on all student achievement outcomes in this study, except for Burdett (2009). Using the study as the unit of analysis, an overall mean was calculated for each study. The studies, outcomes, and results are included in Table 41. Applegate (2008) had one effect to be combined in the summary, the effect size for a composite PLC score and composite student achievement. Bynes (2011), however, had

an effect size from each of the five Hord components and composite student achievement. In the Outcome column, Applegate has “Composite” listed for the one effect to be used in the summary, while Bynes has “Combined”, to designate that she has more than one effect which was averaged. These effects were averaged to provide one overall mean for the Bynes study. The study effect sizes were then weighted by sample size to obtain an overall summary effect. When synthesizing these study means, the summary effect was very small, but significant (d = .143, p = .018). Homogeneity was not violated (p = .119).

Table 41

Summary Results for Student Achievement (N = 20)

Study	Outcome	Cohen's *d*	Standard Error	Lower Limit	Upper Limit	*p* Value
Applegate (2008)	Composite	-0.146	0.460	-1.048	0.756	0.751
Bynes (2011)	Combined	0.365	0.171	0.029	0.701	0.033
Campoli (2011)	Combined	-0.058	0.310	-0.664	0.549	0.853
Cassity (2012)	Combined	0.032	0.268	-0.492	0.556	0.904
Cieslak (2011)	Combined	-1.238	0.580	-2.376	-0.100	0.033
Davis (2009)	Combined	0.727	0.386	-0.030	1.484	0.060
Ervin (2011)	CL	0.430	0.262	-0.084	0.944	0.101
Gallozzi (2011)	Combined	0.266	0.292	-0.305	0.837	0.362
Isoye (2011)	Combined	0.134	0.159	-0.178	0.446	0.399
Kriznar (2011)	Combined	0.022	0.266	-0.498	0.542	0.934
Matthews (2009)	Combined	0.040	0.183	-0.319	0.399	0.827
Orchard (2007)	Reading Composite	2.130	0.709	0.740	3.520	0.003
Roberts (2010)	Combined	-0.112	0.175	-0.454	0.231	0.523
Swinder (2009)	Combined	0.026	0.307	-0.575	0.627	0.933
Terrell (2012)	Combined	0.228	0.245	-0.251	0.707	0.351
Turner (2008)	Combined	0.386	0.159	0.075	0.697	0.015
Varano (2010)	Combined	-0.038	0.190	-0.410	0.335	0.843
Vencel-Mobley (2009)	Combined	0.115	0.071	-0.024	0.254	0.105
Wheaton (2008)	Combined	-0.006	0.343	-0.679	0.667	0.986
Zito (2011)	Combined	0.289	0.490	-0.671	1.249	0.555
Random Model		0.143	0.060	0.025	0.262	0.018*

Note: *Analysis was significant at the 0.05 level.

Research Question 1: What is the relationship between the implementation of professional learning communities and student achievement in reading in preK-12 schools?

A summary analysis was performed to test the effects of PLC components on reading achievement overall in the included studies. As in the previous analysis, the unit of analysis was the study, with means computed for reading outcomes for each study. If only one reading outcome was included in the study, the outcome was listed in the Outcome column. If more than one reading outcome was included in the study, then "Combined" was listed in the Outcome column, and the overall mean was computed for the reading outcomes for that study. The studies were again weighted by sample size. When the means were synthesized, a very small, non-significant Cohen's *d* was found for reading (*d* = .077, *p* = .351). Homogeneity was found to be acceptable (*p* = .163). The results from this analysis are presented in Table 42.

Table 42

Summary Results for Reading Achievement (N = 14)

Study	Outcome	Cohen's *d*	Standard Error	Lower Limit	Upper Limit	*p* Value
Cassity (2012)	Combined	0.032	0.268	-0.492	0.556	0.904
Cieslak (2011)	Combined	-1.266	0.582	-2.405	-0.126	0.030
Davis (2009)	Combined	0.484	0.371	-0.242	1.211	0.191
Gallozzi (2011)	Reading Composite	0.191	0.290	-0.377	0.759	0.510
Isoye (2011)	Combined	0.091	0.159	-0.221	0.402	0.569
Kriznar (2011)	Reading SC	-0.110	0.265	-0.629	0.409	0.678
Matthews (2009)	Reading CL	0.062	0.183	-0.297	0.421	0.735
Orchard (2007)	Reading Composite	2.130	0.709	0.740	3.520	0.003
Roberts (2010)	Reading CL	-0.032	0.168	-0.361	0.297	0.849
Swindler (2009)	Combined	-0.016	0.307	-0.617	0.586	0.960
Terrell (2012)	Combined	0.336	0.246	-0.146	0.818	0.172
Varano (2010)	Combined	-0.036	0.190	-0.408	0.337	0.851
Wheaton (2008)	Combined	0.005	0.343	-0.668	0.678	0.988
Zito (2011)	Reading Composite	0.316	0.491	-0.646	1.278	0.520
Random Model		0.077	0.083	-0.085	0.240	0.351

Several sub-analyses were conducted to determine the relationship between teacher participation in PLCs and student learning in reading. The first analysis was based on four studies which reported a quantitative relationship between a PLC survey composite score and some form of student achievement in reading. Results from this analysis indicated that PLCs had a positive, moderate effect on student learning in reading in the schools included in this analysis (d = .429). Though small sample sizes may have influenced the non-significant result, the size of the effect indicated that the influence of teacher participation in professional learning communities may have resulted in visible changes in student learning in these schools (Hattie, 2009).

Small to moderate effects in reading, both positive and negative, were obtained in the analysis of PLC components (see Table 43). Effect sizes for Shared and Supportive Leadership in reading ranged from very small in the overall analysis, to moderate in the studies which included only elementary schools. In the Shared Vision component, all effects were positive, with moderate effects on elementary schools in the studies. Collective Learning, Shared Personal Practice, and Supportive Conditions yielded very small to moderate negative effects. In other words, as collaborative learning, shared practice, and the perception of supportive factors increased in these schools, student achievement in reading decreased.

Table 43

PLC Components and Effect Sizes for Reading

PLC Component	School Level	# of Studies	Cohen's *d*
Shared and Supportive Leadership	All	6	0.092
	Elementary	2	0.483
	Secondary	4	-0.007
Shared Vision	All	7	0.137
	Elementary	2	0.355
	Secondary	5	0.062
Collective Learning	All	8	-0.012
	Elementary	2	-0.410
	Secondary	7	0.002
Shared Personal Practice	All	2	-0.478
Supportive Conditions	All	7	-0.098
	Elementary	2	-0.525
	Secondary	5	-0.028

There were, of course, some studies which skewed the analyses either positively or negatively. Cieslak (2009) analyzed the effects of PLCs on student achievement by various subgroups, such as special education and Limited English Proficiency (LEP) students. The effect sizes from his analyses tended to be large and negative. Though the statistics from his study tended to skew the data in this analysis, I decided to leave these effects in each component analysis due to the nature of these student subgroups. If PLCs are to be successful in changing student achievement, then PLCs should address the learning of all students, not just average students.

Although the summary effects of Supportive Conditions were negative in each analysis for reading, examination of the survey items added richness to these findings. Swindler (2009)

primarily assessed relational factors in his study. His study was the only one which yielded a large, positive effect for Supportive Conditions in reading. Although this caveat does not imply causality, it does provoke deeper consideration of these overall results in light of the differences between relational and structural factors in facilitating the work of PLCs.

Burdett (2009) found mixed results in his analyses of PLC implementation and student achievement in reading over time. In his analyses, he obtained moderate to large effects (Cohen's kappas) in components which corresponded to the Hord components of Shared and Supportive Leadership and Shared Vision. He also found Colleague, or the feeling that one is accepted as a colleague, to be influential in his results. With a large effect size, Colleague corresponded to the relational factors of Supportive Conditions in the Hord model.

Burdett's results mirrored the outcomes obtained in these analyses. The first hypothesis, there is a significant, positive relationship between teachers' participation in PLCs and student achievement in reading, was only partially supported. Although the summary analysis for reading was not significant, one component analysis resulted in a significant, positive result: the relationship between Shared and Supportive Leadership and reading achievement in elementary schools. A moderate effect was also found between Shared Vision and reading achievement in elementary schools in these analyses. Although these results should not be generalized to the population, these results may reflect a need to examine individual components of PLCs which may have influence on student achievement in reading.

Research Question 2: What is the relationship between the implementation of professional learning communities and student achievement in math in preK-12 schools?

A summary analysis was performed to determine the relationship between PLC implementation and student achievement in math. Again, the unit of analysis was the study, and

means for math outcomes were computed for each study. The summary effect for math was found to be very small and non-significant (d = .061, p = .418). Homogeneity was not violated (p = .310). The results for this summary analysis are included in Table 44.

Table 44

Summary Results for Math Achievement (N = 13)

Study	Outcome	Cohen's *d*	Standard Error	Lower Limit	Upper Limit	*p* Value
Campoli (2011)	Combined	-0.058	0.310	-0.664	0.549	0.853
Cieslak (2011)	Math SC	-1.155	0.577	-2.286	-0.024	0.045
Davis (2009)	Combined	0.970	0.401	0.184	1.756	0.016
Gallozzi (2011)	Math Composite	0.341	0.293	-0.233	0.915	0.244
Isoye (2011)	Combined	0.178	0.159	-0.135	0.490	0.265
Kriznar (2011)	Math SC	0.154	0.266	-0.367	0.675	0.563
Matthews (2009)	Math CL	0.018	0.183	-0.341	0.377	0.922
Roberts (2010)	Math CL	-0.191	0.181	-0.546	0.164	0.291
Swindler (2009)	Combined	0.067	0.306	-0.533	0.667	0.827
Terrell (2012)	Combined	0.120	0.243	-0.356	0.596	0.621
Varano (2010)	Combined	-0.040	0.190	-0.412	0.333	0.836
Wheaton (2008)	Combined	-0.017	0.344	-0.691	0.656	0.960
Zito (2011)	Math Composite	0.262	0.489	-0.696	1.220	0.592
Random Model		0.061	0.076	-0.087	0.210	0.418

Sub-analyses were conducted to assess the relationship of PLC activities to student learning in math. The composite analysis, which examined the effects of an overall PLC composite score on student achievement in math, indicated a small to moderate, positive link between PLC implementation as a whole and math achievement in these two studies (d = .320). Although the samples were small, the results for the schools involved in these studies indicated that as teacher participation in PLC activities increased, student achievement in math increased.

Individual PLC components were analyzed to assess the relationships between each component and student learning in math (see Table 45). Similar to the reading results, small to moderate effects were found between Shared and Supportive Leadership and math achievement, and between Shared Vision and math achievement. Although the overall effect of Shared and Supportive Leadership was negligible, the effect on elementary achievement in math was small, but positive. In the overall Shared Vision analysis, there was a small effect on math achievement in all schools; and in the elementary analysis, a large, positive effect was found on student learning in math.

When Collective Learning and math achievement were analyzed, very small, positive effects were found for the all schools category and for secondary schools. In the elementary schools, however, a very small, negative relationship was discovered. No studies were available which examined Shared Personal Practice in relation to math achievement.

As with the reading analyses, Supportive Conditions yielded negative results when compared with math achievement. Again, Swindler (2009) examined relational factors in his assessment of Supportive Conditions. He found a small, positive effect of these relational factors of trust and acceptance on math achievement (d = .238). These results indicated that relational and structural factors should, in future studies, be analyzed separately to determine the effects on student learning.

Table 45

PLC Components and Effect Sizes for Math

PLC Component	School Level	# of Studies	Cohen's *d*
Shared and Supportive Leadership	All	6	0.054
	Elementary	3	0.229
	Secondary	3	0.000
Shared Vision	All	6	0.257
	Elementary	2	0.582
	Secondary	4	0.150
Collective Learning	All	7	0.043
	Elementary	2	-0.015
	Secondary	6	0.074
Shared Personal Practice	All	NR*	NR*
Supportive Conditions	All	6	-0.037
	Elementary	2	-0.194
	Secondary	4	-0.020

*No studies which met the search criteria attempted to quantitatively link Shared Personal Practice to student achievement in math.

Burdett found small to moderate effects on math achievement over time in his study. Shared and Supportive Leadership as well as Shared Vision were positively linked with math achievement. According to Burdett, when teachers in these schools felt they had a say in school policy, there was a moderate effect on student scores on math assessments. As with the reading analyses, Colleague had a large effect on student learning in math. In other words, as teachers felt more accepted as a colleague in these schools, math achievement for their students increased.

There seemed to be a pattern between the results in Burdett's study over time and the results in these analyses. Though the results for the components and math achievement were mixed, results for the analysis of the two studies examining PLC implementation as a whole and

math achievement were small to moderate. There were, however, no significant relationships between PLCs and math achievement. The second hypothesis for this study, there is a significant, positive relationship between PLC implementation and student achievement in math was not supported. Thus, the null hypothesis was not rejected.

Research Question 3: What is the relationship between collective efficacy and professional learning communities in preK-12 schools, and the effects on student achievement?

Cassity (2012) and Gallozzi (2011) examined the quantitative links between collective efficacy, professional learning communities, and student achievement. Both found significant, positive relationships between PLCs and collective efficacy overall, as well as significant, positive relationships between three of the five PLC components and collective efficacy. Shared and Supportive Leadership was not significantly correlated to collective efficacy in the Gallozzi study (r = .138, p = .334), and neither Shared and Supportive Leadership (r = .131, p = .323) nor Shared Practice (r = .185, p = .161) were significantly correlated to collective efficacy in Cassity's study.

Cassity found a strong, positive link between collective efficacy and student achievement in reading (r = .604, p = .000; d = 1.516). Gallozzi found negative, non-significant correlations, however, between collective efficacy and student achievement in both reading (r = -.273, p = .112, d = -.568) and math (r = -.175, p = .316, d = -.355). Gallozzi's results are in contrast to extant literature, which maintained that collective efficacy has positive effects on student learning (Bandura, 1993; Goddard, 2001; Goddard et al., 2000; Goddard et al., 2004; McCoach & Colbert, 2010). Although they asserted that collective efficacy has direct effects on student achievement, Moolenaar and colleagues (2011) acknowledged that socioeconomic factors may have a powerful influence as well.

When teachers are asked to self-assess their ability, as well as the ability of their colleagues to impact the learning of their students, sometimes this ability is overestimated (Bruce et al., 2010). It is perhaps not until instructional changes are made, that changes in student learning take place (Bruce et al., 2010). According to Bruce and colleagues, as changes in instruction lead to higher student achievement, perceptions of collective efficacy increase. With this rise in collective efficacy comes the initiative to work harder to affect student learning. With no change in instructional practice, perceptions of collective efficacy are often overestimated, and based on "untested self-appraisals" (Bruce et al., 2010, p. 1607).

Based upon the results from these two studies, the third hypothesis was only partially supported. Although there were significant correlations between PLC implementation and collective efficacy, there were mixed results between collective efficacy and student achievement. Cassity established a link between PLCs and collective efficacy and between collective efficacy and student achievement in reading, while Gallozzi's results did not validate this link.

Limitations

As with any study, there were limitations which may have affected the outcomes. As described in the first chapter, this dissertation was limited by the number of dissertations which met the search criteria. To ensure the same level of quality in each study, the previously described criteria limited the number of studies included in this analysis.

This meta-analysis examined studies which used survey data to assess the strength of PLC characteristics. In the included studies, some surveyed principals, some surveyed teachers, and others surveyed a combination of the two. Though it was assumed that these staff members answered honestly and to the best of their ability, there is always the possibility that they will

answer in such a way as to put themselves, or their school, in the best possible light. This phenomenon involves "overreporting of admirable attitudes and behaviors and underreporting those that are not socially respected" (Krosnick, 1999, p. 545).

Optimizing and satisficing are often problematic in survey responses (Krosnick, 1999). According to Krosnick, answering questions optimally involves complex cognitive processes. Survey respondents must read the questions, recall pertinent information, make an overall judgment, and then select an answer which corresponds to this judgment. Then, according to Krosnick, they must repeat this process for each question. Unless respondents see the value in completing the survey, they may simply provide answers, with no regard to the quality of the responses. This lack of understanding of the importance of the survey may lead a respondent to satisfice (Krosnick, 1999), or to expend less cognitive energy in completing the survey by just choosing a good answer rather than the best one.

Who responds to the survey can be as important as how they respond (Desimone, 2006). Principals and teachers may have different levels of understanding of a reform initiative; and therefore, may answer the same survey items in different ways, according to Desimone. Furthermore, someone who supports the initiative may report positive results while those who are opposed to the reform may answer more negatively (Desimone, 2006). According to Desimone, qualitative information from interviews or observations may be necessary to gain a more complete view of implementation. Qualitative results were not included in this analysis.

Terminology agreement is another source of survey limitation. Fowler (1995) asserted that the researcher and the respondent should have the same understanding of the terminology in the survey (Desimone, 2006). Because there is no universally accepted definition of a learning community (Fullan, 2006; Lavie, 2006) and because educators often do not have a deep

understanding of an initiative they are trying to implement (Alexander et al., 1996; Hord, 1997; Wood, 2007), this agreement is difficult to ensure.

Another limitation to this analysis is that for the most part, only state assessments were used to examine student learning. As some have implied, using high-stakes testing to assess student learning is questionable at best (Nichols, Glass, & Berliner, 2006) and these results "may fail to capture the breadth of impact of a PLC" (Vescio et al., 2008, p. 90). Examining changes in student learning may require alternate forms of assessment to reveal true changes in learning; and thus, standardized assessments may not be the best measure of how teacher participation in PLCs affects student achievement.

Conclusions

Similar to the literature base, this study produced mixed results as to the relationship of professional learning community implementation and student learning in reading and math. What did seem to be a pattern in the studies examined in these analyses, however, was that some components of PLCs may perhaps contribute to student achievement individually. Consistent results seemed to indicate that as elementary teachers were given the opportunity to share leadership and were supported by their administrators, student achievement in both reading and math increased. In schools where there was a shared vision that was developed collaboratively, reading and math achievement increased on all school levels. Relational supports which facilitated PLC implementation seemed to enhance student achievement. In the studies in this analysis, as teachers perceived that their colleagues were trustworthy and that they themselves were considered to be a vital part of the faculty, student achievement increased in both reading and math.

Results from Collective Learning and Shared Personal Practice did not indicate increases in student learning. One possibility for the small, negative relationships in Collective Learning was that most schools were using this collaborative time to do different things, such as discussing curriculum, planning lessons, collaborating around assessment, and conducting inquiry learning, just to name a few. This discrepancy may have influenced the outcomes of this analysis. As Hord (1997) contended, it is "not simply the presence of the learning community but what the community chooses to focus on that influences the outcome" (p. 26).

There were only two studies which examined Shared Personal Practice as a separate component of PLCs in reading, resulting in a negative, moderate effect (Cassity, 2012; Cieslak, 2011). On the contrary, Bynes (2011) found a significant, large effect of shared practice on overall student achievement (d = .706). No studies which met the search criteria of this analysis examined shared practice in relation to math achievement. As a result of these findings, it appeared that many teachers were not sharing their practice with colleagues, allowing for feedback and discussion.

Even where there is deep implementation of PLC characteristics, there is often limited shared practice (Hord & Rutherford, 1998). The process of observing others' practice and offering constructive feedback is one that must be learned; and in many instances, professional development must take place before this process becomes effective (Hord & Sommers, 2008). According to Hord and Sommers, this deprivatization of practice may be the catalyst for teachers to change their practices and to ensure that newly adopted, more effective strategies are being used in the classroom.

Zito (2011) found significant relationships between collaboration and changes in instructional practice (r = .513, p < .01, d = 1.195), between collaboration and perceived changes

in student learning ($r = .480$, $p < .01$, $d = 1.094$), and between changes in instructional practice and perceived changes in student learning ($r = .711$, $p < .01$, $d = 2.022$). As stated in the previous section, perhaps the effects of collaboration are not as evident in standardized test results; perhaps these changes are more evident through the eyes of the classroom teacher. As Zito maintained, "more work needs to be done in terms of documenting the impact of PLCs on student learning beyond the use of standardized achievement tests" (p. 146).

When teachers have no clear expectation to focus on instruction, there are no changes in instructional practice (Supovitz, 2002). Moreover, unless teachers are provided the opportunities to make connections between instructional practices and student learning, no changes will occur (Supovitz & Christman, 2003). In many cases, teachers do not have the capacity to conduct effective group work and may require external assistance to change pedagogy (Louis & Marks, 1998; Mullen & Hutinger, 2008) and to learn how to effectively work in teams for the benefit of students (Supovitz, 2002; Thessin & Starr, 2011).

Student achievement does not change unless instructional practices change (Bruce et al., 2010; Hollins et al., 2004; Hord, 1997; Hord & Sommers, 2008; Louis & Marks, 1998; Vescio et al., 2008; Visscher & Witziers, 2004). Collective Learning is focused on providing higher-quality instruction, which leads to better student outcomes (Hord & Sommers, 2008). When teachers do not experience continual, high-quality professional learning, their students are limited to the instructional strategies these teachers learned in their undergraduate studies, or worse yet, the ones they themselves experienced when they were in elementary and secondary school. Perhaps because many teachers are practicing from an education received years ago, these teachers need assistance in changing their ineffective instructional practices.

In keeping with the results of these analyses, highly functioning learning communities may be more characteristic of elementary schools than secondary schools (Louis & Marks, 1998). Roberts (2010) found significant differences between elementary and secondary teachers in their perceptions of personal skill in assuring students learn at high levels ($F(3,219) = 2.974$, $p < .05$). Significant differences also resulted between elementary and secondary teachers in their perceptions of their team's skill level in creating a culture of collaboration ($F(3,212) = .436$, $p < .05$) and in their perceptions of their team's skill level in focusing on academic results ($F(3,209) = 1.082$, $p < .05$). Cassity (2012) found that middle school teachers were more likely to participate in PLCs than high school teachers ($p = .001$). Although high schools are difficult to change, perhaps the best hope for PLC implementation is through department teams (Rhyne, 2011). The results of this study have implications for both practitioners and researchers.

Implications for Practitioners

As indicated by the results of this study, there are implications for school and district leaders as well as teachers. Even though there were mixed results for PLC implementation and its effects on student achievement in reading and math, some implications for practice were perhaps indicated. First, school and district leaders might give teachers opportunities to share leadership: to work together to create solutions for instructional problems as well as to have input into the decision-making process for the school as a whole. This shared leadership may take the form of grade level teams, content area teams, or entire faculty groups. When teachers have more discretion in instructional issues, they may feel more accountable for the academic success of their students (Kruse et al., 1994).

All staff members should perhaps participate in the development of common beliefs and a school vision that is jointly shared by all teachers and staff. According to Hord (1997), a shared

vision “is not just agreeing with a good idea; it is a particular mental image of what is important to an individual and to an organization” (p.12). The content of this shared vision and the process of development are fundamental (Westheimer, 1999). Often conflict arises between stated values and demonstrated values (Achinstein, 2002). The common values and vision must be fundamentally shared by all members of the school community, with all members having an equal voice in the development that is heard and appreciated (Achinstein, 2002; Furman, 1998; Grossman et al., 2001; Lavie, 2006; Sergiovanni, 1994; Shields & Seltzer, 1997; Westheimer 1999). Without equality of voice, conflict and diversity may be stifled, resulting in the maintenance of the status quo (Achinstein, 2002).

Principals may need to work with district administrators to provide professional development or models for teachers to learn to work together in groups and to learn to use inquiry to solve problems of practice. If Shared Personal Practice is to develop, then observation and feedback skills may need to be developed. This level of teacher collaboration is such that it “at once enables and compels teachers to offer and request advice in helping each other improve instructionally” (Rosenholtz, 1989a, p. 103), and many teachers need professional learning to function in this level of collaboration which changes practice, and thereby, she argued, changes student achievement.

Principals may find that developing relational factors among staff members increases collaboration and student learning. As indicated by the effects of Supportive Conditions, the schools where teachers felt accepted as a colleague, or where there was trust among staff, had increased student achievement. True collaboration is unlikely to materialize if staff members do not trust one another (Hoy, Gage, & Tarter, 2006). According to Hord and Sommers (2008), trust is paramount for individuals to give and receive productive feedback. In a reciprocal manner,

positive, trusting relationships develop as a result of this open practice (Hord & Sommers, 2008; Hoy, Gage, & Tarter, 2006).

Implications for Researchers

As there are implications for practice, the results of this study also have implications for future research. Although the results for PLC implementation and student achievement in reading and math were inconclusive, there were positive results for some individual PLC components and student learning in reading and math. Shared and Supportive Leadership, Shared Vision, and Supportive Conditions (relational) exhibited small, but positive effects on reading and math achievement, while the effects for these components in elementary schools were larger overall. Shared Personal Practice was conspicuously limited in the studies in this analysis. As Hord alleged, shared practice is absent in even many of the deeply implemented PLCs and is often the last component to be implemented. Because of these factors, more research should be conducted on the five PLC components to determine if one or more of the components are more strongly linked with math or reading achievement. Researchers may also want to examine qualitative evidence of PLC implementation to use alongside survey information when comparing PLC work to student learning.

As a third hypothesis, this study analyzed dissertations which examined the quantitative relationships between collective or teacher efficacy, learning communities, and student achievement. After an exhaustive search of dissertation databases, only two such studies emerged. Collective efficacy has been linked to student achievement (Bandura, 1993; Cassity, 2012; Goddard, 2001; Goddard et al., 2000; Goddard et al., 2004; McCoach & Colbert, 2010) and to PLCs (Cassity, 2012; Gallozzi, 2011) in the literature. Although student demographic factors have a powerful influence on student achievement (Hoy, Gage, & Tarter, 2006;

Moolenaar et al., 2011), this influence may be linked to teacher beliefs about their efficacy in working with these students (Bandura, 1993). More research should be conducted which attempts to establish collective or teacher efficacy as mediating variables between PLC implementation and student learning.

Although this study focused on the Hord model of professional learning, there are other models of learning communities. Lavie (2006) described five different types of community in his exploration of PLCs in education. Cultural, effectiveness, and restructuring forms of community correspond to the reformist ideology, or PLCs which are results-oriented as in the Hord model. Other forms of community, such as democratic and critical, seek community as a goal within itself, outside the benefits of increased test scores. These reformists advocate for social justice, believing that true community appreciates the divergent thinking of all group members. Perhaps these democratic communities, which seek equality for all members, may be more effective in addressing differing teaching philosophies and advocating for students of subgroups. Cieslak (2011) found large, negative correlations between student subgroup achievement and PLC implementation. Examination of PLC ideology may be warranted to assess which types of PLCs are more effective in changing student achievement.

Sample size continues to be a problem in linking PLC implementation to student learning. Many studies of PLCs are focused on a small sample of schools which makes establishing significance more difficult. More meta-analyses should be conducted as more studies become available, perhaps with less stringent guidelines for inclusion of studies. Glass (1976) maintained that eliminating studies which are poorly designed results in the exclusion of important data. Thus, including dissertations from universities which are not research-oriented might result in larger sample sizes, and therefore, different outcomes.

Although meta-analyses provide greater statistical power in analyzing larger samples, there are still limitations to the method. Meta-analysis methodology has been faulted for "oversimplifying the results of a research domain by focusing on overall effects and downplaying mediating or interaction effects" (Wolf, 1986, p. 53). According to Wolf, quantitative analyses that examine mediating and interaction effects result in higher quality studies. Although this analysis examined the components of PLCs, it did not consider the interaction between the components which may strongly influence student achievement. Future studies perhaps should consider the interaction between the components of PLCs to assess the effects on student achievement.

Summary

This study analyzed the results of dissertations which attempted to link teacher work in PLCs to student achievement. Although the research hypotheses were only partially supported, this meta-analysis filled a gap in the literature, while also revealing others. As to this point, no meta-analyses had examined the components of PLCs and their contribution to student achievement. This analysis assessed these relationships and established a frame of reference for others to expand upon this work.

Different philosophies of learning communities were addressed in this study. Hord (1997) contended that the focus should not be on having a PLC, but it should be on what is done within the PLC. Others maintained that organizing people into a community is an auspicious goal within itself, hailing the positive results from people working together for the good of a democratic society (Grossman et al., 2001; Westheimer, 1999). Perhaps both schools of thought may converge into one overarching ideal: When people work together for the good of all involved, listening to and appreciating the contributions of each group member, seeking out best

practices to change instruction; then not only test scores change, but schools change for the better.

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APPENDIX A

IRB EXCLUSION LETTER

Office for Research

Institutional Review Board for the Protection of Human Subjects

June 20, 2013

THE UNIVERSITY OF ALABAMA RESEARCH

Susan Patrick
ELPTS
College of Education
The University of Alabama

Re: IRB Requirement for "A Meta-Analysis of Dissertation Research on the Relationship between Professional Learning Community Implementation and Student Achievement"

Ms. Patrick:

This letter comes as a response to your communication received June 20, 2013. According to the Office for Human Research Protection (OHRP) under policy 45 CFR 46.101 the proposed work is not human subjects research.

Because the work is not considered human subjects research, it does not require IRB approval and is therefore excluded from review by the IRB.

If you have any questions or if I can be of further assistance please do not hesitate to contact me.

Sincerely,

Carpantato T. Myles, MSM, CIM
Director of Research Compliance & Research Compliance Officer
Office of Research Compliance
The University of Alabama

358 Rose Administration Building
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APPENDIX B

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Publication: Educational Administration Quarterly
Publisher: SAGE Publications
Date: 02/01/1999

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